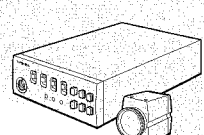
TOSHIBA

FILE NO. 210-9609

SERVICE MANUAL

3 CCD COLOR CAMERA

IK-TU48P



IK-TU48P

PRINTED IN JAPAN, Sep., 1996 Ⓢ

SAFETY NOTICE

SAFETY PRECAUTIONS

LEAKAGE CURRENT CHECK

The AC line cord of power supply connect to terminal. And plug the AC line cord of power supply into a 230V AC outlet. Use an AC voltmeter, having 5000Ω per volt or more sensitivity.

Connect a 1500Ω 10W resistor, paralleled by a 0.15 μF 150V AC capacitor between a known good earth ground (water pipe, conduit, etc.) and all exposed metal parts of cabinet (screw heads etc.).

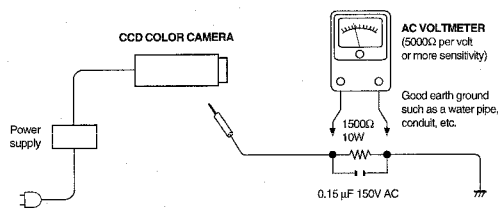
Measure the AC voltage across the 1500Ω resistor.

The test must be conducted with the AC switch on and then repeated with the AC switch off. The AC voltage indicated by the meter may not exceed 0.3V. A reading exceeding 0.3V indicates that a dangerous potential exists, the fault must be located and corrected.

Repeat the above test with AC line reversed.

NEVER RETURN A CAMERA TO THE CUSTOMER WITHOUT TAKING NECESSARY CORRECTIVE ACTION.

READING SHOULD NOT EXCEED 0.3V



Test all exposed metal.

Voltmeter Hook-up for Leakage Current Check

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

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SECTION 1
GENERAL DESCRIPTION

1. INFORMATION

CAUTION

This product is class A of EN55022. In residential area, it may cause radio interference. In this case, user takes measures to meet the situation.

INFORMATION

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

USER-INSTALLER CAUTION: Your authority to operate this FCC verified equipment could be voided if you make changes or modifications not expressly approved by the party responsible for compliance to Part 15 of the FCC rules.

2. COMPONENTS

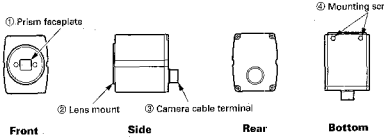
(1) Camera head
(without lens, protection cap attached) 1
(2) Camera control unit 1
(3) Accessories 1
(a) Instruction manual 1

3. ITEMS CONTROLLED BY USING ON SCREEN DISPLAY

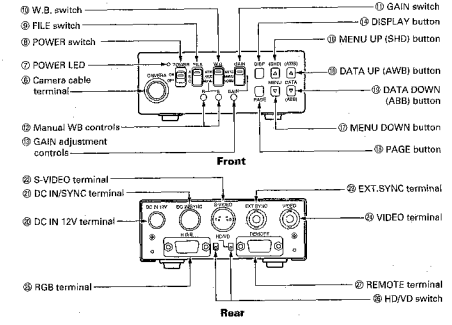
	Item		Available selections	Preset value (Factory setting)
Electronic shutter	MODE		AUTO, MANU, SS, 1 PULSE	MANU
	AUTO level		-99 ~ 00 ~ 99	00
	AUTO peak (average)		00:10 ~ 05:05 ~ 10:00	05: 05
	AUTO response speed		01 ~ 05 ~ 10	05
	AUTO area		PRESET A , PRESET B, PRESET C, PRESET D, USER (USER area is possible to set in 64 zones.)	PRESET A
	MANU speed		OFF, 1/100s, 1/250s, 1/500s, 1/1000s, 1/2000s, 1/4000s, 1/10000s	OFF
	Syncro. scan	FLD	001/625H ~ 313/625H, OFF, 001FRM ~ 256FRM	OFF
		FRM	001/626H ~ 313/625H, OFF, 002FRM ~ 256FRM	–
	1 PULSE		0.05ms ~ 20ms	20ms
	Storage mode		FLD, FRM	FLD
AUTO maximum gain			00 dB ~ 18 dB	09dB
AWB	Offset		-10 ~ 00 ~ 10	00
	Area		PRESET A, PRESET B, PRESET C, PRESET D, USER (User area is possible to set in 64 zones.)	PRESET A
Gamma correction switching			ON, OFF	ON
Gamma correction level			-10 ~ 00 ~ 10	00
Black gamma			LOW, NORM, HIGH	NORM
Detail gain			-5 (OFF) ~ 0 ~ 5	0
Detail boost frequency			LOW, NORM, HIGH	NORM
Master pedestal			-50 ~ 00 ~ 50	00
Ext. sync.	H phase adjustment		-99 ~ 00 ~ 99	00
	SC 0/180		0, 180	0
	SC phase adjustment		-99 ~ 00 ~ 99	00
OUTPUT		1	RGB, Y/Pr/Pb	RGB
		2	VBS, Y/C	VBS
Negative/Positive inversion			NEGA, POSI	POSI
Detail signal output			ON, OFF	OFF
Shading correction			ON, OFF	OFF
G SYNC			ON, OFF	ON

4. NAMES AND FUNCTIONS

Camera Head



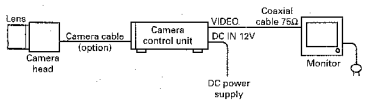
Camera Control Unit



① Prism faceplate	The protection cap is attached on the lens mount portion. After removing the cap, mount the lens. Be careful not to scratch or touch the optical area.
② Lens mount	C mount lens is mounted.
③ Camera cable terminal	The camera cable is connected.
④ Mounting screws	Screw holes to fix the camera head mount. (M3 depth of camera section: 4mm)
⑤ None	
⑥ Camera cable terminal	The camera cable is connected.
⑦ POWER LED	Lights when the power is turned on.
⑧ POWER switch	Turns on or off the power supply.
⑨ FILE switch	Switch the scene files. (A/B/C)
⑩ W.B. switch	Switch the white balance mode. (ATW/AWB/MANU)
⑪ GAIN switch	Switch the gain mode. (AUTO/MANU/NORM)
⑫ Manual WB controls	Adjust R and B gains when the white balance switch ⑩ is set to MANU.
⑬ GAIN adjustment controls	Adjust video signal gain when the gain switch ⑪ is set to MANU.
⑬ DISPLAY button	Used when switching the display.
⑱ PAGE button	Used when switching to the menu and when selecting the menus.
⑭ MENU UP (SHD) button	Select the function to be confirmed or changed on the menu. (Also used when performing the shading correction.)
⑰ MENU DOWN button	Select to confirm the function or to change the menu.
⑮ DATA UP (AWB) button	Changes the value of the function selected by the MENU (UP/DOWN) button. (Also used when using AWB.)
⑯ DATA DOWN (ABB) button	Changes the value of the function selected by the MENU (UP/DOWN) button. (Also used when using ABB.)
⑲ DC IN 12V terminal	Accept a DC power input (12V).
⑳ DC IN/SYNC terminal	When DC IN 12V terminal ⑲ is not used, accept DC12V input. HD and VD signals are input/output. (The input/output is switched by the HD/VD switch ㉕.) When 1 pulse operation is used, the trigger signal is input and the index signal is output.
㉒ S-VIDEO terminal	Outputs Y (luminance) and C (color) signals.
㉙ EXT. SYNC terminal	Used when the camera output signal is synchronized by the external signal. (BNC connector)
㉔ VIDEO terminal	VBS output. Connected to a monitor, VTR, etc. (BNC connector)
㉓ RGB terminal	Used as the connector terminal for Y/C or VBS output 2, RGB or Y/Pr/Pb output, and SYNC output.
㉕ HD/VD switch	Switch input/output of HD, VD signals at DC IN/SYNC terminal ㉑. Switch terminal resistor when HD and VD signals are input.
㉗ REMOTE terminal	Used when controlling functions of the camera by RS-232C.

5. CONNECTION

5.1 Standard Connection



5.2 Cautions on Connection

- When connecting the camera cables, be sure to turn off the camera control unit and the other equipment connected.
- For DC power supply connecting to DC IN 12V terminal, use Class II DC power supply approved according to EN60950 in Europe.

  (Betrieb nur mit zertifiziertem AC-Adapter nach EN60950)

  When camera is used in USA, use UL listed and/or CSA approved ungrounding type AC adaptor with the specifications described below.

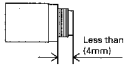
Power supply voltage:	DC12V ± 10%
Current rating:	More than 830mA, less than 2.5A
Ripple voltage:	Less than 50mVp-p
Connector:	HR10A-7P-4S by HIROSE electronics Co. Ltd.
	Pins 1, 2: 12V
	Pins 3, 4: GND

- We suggest to use a C mount lens for 3CCD camera.

  When using other lens, the best camera performance of this camera may not be obtained.

  (For example, low resolution may occur, focus may be lost through the range of a zoom lens, and flare ghost shading may occur.)

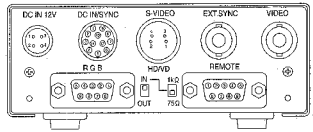
  Furthermore, in order to avoid damaging the mounting portion of the camera head, use a lens which projection dimension from the mounting base is less than 0.157" (4 mm).



- If the screw on the camera connector portion of the camera cable looses, noise may appear on the screen. So be sure to tighten the connector fully.

5.3 Connection on Back Panel

Back panel view



5.3A Connector Pin Assignments

DC IN 12V

1	+12V
2	+12V
3	GND
4	GND

DC IN/SYNC

1	GND
2	+12V
3	GND (for INDEX)
4	INDEX
5	GND (for HD)
6	HD (IN/OUT)
7	VD (IN/OUT)
8	GND (for TRIGGER)
9	TRIGGER
10	GND
11	+12V
12	GND (for VD)

S-VIDEO

1	GND
2	GND
3	Y
4	C

RGB

1	GND (for VBS, Y/C)
2	GND (for R/G/B, Y/Pr/Pb)
3	R/Pr OUT
4	G/Y OUT
5	B/Pb OUT
6	VBS/Y OUT
7	SYNC OUT
8	GND (for SYNC)
9	–/C OUT

REMOTE

1	NC
2	TXD
3	RXD
4	DSR
5	GND
6	DTR
7	CTS
8	RTS
9	NC

* When using the REMOTE terminal, please consult with your dealer.

6. OPERATION

① Referring to the item "5. CONNECTION", connect each equipment correctly.
② Turn on the connected equipment and the camera.
③ When using the camera for the first time and when replacing the camera cable and the camera head, be sure to operate the ABB adjustment in advance, referring to the item "6.1 Automatic Black Balance".
④ Facing the lens to the object, operate the lens iris adjustment, focus adjustment, etc.
⑤ Referring to the item "6.2 White Balance", operate the adjustment.
⑥ Referring to the items "6.3 Scene File, 6.4 Gain, 7. MODE SETTING BY ON SCREEN DISPLAY", select the necessary items.

6.1 Automatic Black Balance

Black balance adjustment is necessary to get the correct black picture level.

- Close the lens iris.
- Disable the color bar pattern or the character display by pushing the [DISP] button, if necessary.
- Hold the [DATA DOWN] button for approx. 1 second.
- When the black balance adjustment operation starts, the character ABB blinks on the screen.
- When the black balance adjustment operation finishes, the character ABB ends blinking and the result appears for approx. 1 second.

Display	Meaning
ABB OK	Automatic black balance adjustment finishes correctly.
ABB NG CLOSE LENS	Automatic black balance adjustment cannot be performed because the lens iris is open. Close the lens iris.
ABB NG	Automatic black balance adjustment cannot be performed. Operate the automatic black balance again.

6.2 White Balance

For the white balance adjustment for this camera, ATW (Automatic Trace White balance), AWB (Automatic White Balance) and MANU (manual white balance) adjustments are provided. Select the desired mode by the [W.B.] switch.

	ATW (Automatic Trace White balance)	AWB (Automatic White Balance)	MANU (Manual White Balance)
Outline	Camera measures the object color temperature and adjust the white balance automatically.	Adjust white balance by displaying the white object inside the area set by AWB menu and pressing the [DATA UP] button.	Adjust the white balance manually using the white balance adjustment controls while shooting the white object.
Features	Traces variations of color temperature and adjusts the white balance automatically.	Measurement accuracy is higher than ATW. This mode is effective when shooting under less variations of color temperature.	Artificial white balance setting can be set. The manual adjustment is most effective under shooting condition with no color temperature variation.
Notes	If an illumination is low, white balance may not be corrected. When the shutter speed is in the 1 pulse or the long period exposure mode, ATW is not available.	When the shutter speed is of the 1 pulse mode, AWB is not available.	Adjustment is performed by confirming with a monitor or a vector scope.

① AWB

- Set [WB] switch to AWB.
- Disable the color bar pattern or the characters by pushing the [DISP] button, if necessary.
- Shoot a known white object entirely in the area set by the AWB menu (refer to the item "7.2 (3.2) (b) Changing AWB measurement light area".) and push [DATA UP] button for approx. 1 second.
- The character AWB blinks on the screen when the AWB starts.
- The character AWB ends blinking when the AWB finishes, and the result is displayed for approx. 1 second.

Display	Meaning
AWB OK	Automatic white balance adjustment finishes correctly.
AWB NG LEVEL NG	Automatic white balance adjustment cannot be performed because the video level is too high or too low. Set the video level properly.
AWB NG C. TEMP LOW	Automatic white balance adjustment cannot be performed because the color temperature is too low. Change the illumination or use a color temperature conversion filter.
AWB NG C. TEMP HIGH	Automatic white balance adjustment cannot be performed because the color temperature is too high. Change the illumination or use the color temperature conversion filter.
AWB NG NOT AVAILABLE	Automatic white balance adjustment cannot be performed because the shutter speed mode is 1 pulse mode.
AWB NG	Automatic white balance adjustment cannot be performed for other reasons. Such as no white area is included in an object, etc.

② MANU

- Set the [WB] switch to MANU.
- Shoot a known object, adjust the white balance using the white balance adjusting controls with a screwdriver, confirming with a monitor or a vector scope.

6.3 Scene File

Three scene files (A, B, C) are user memories for camera setup. These are selectable depending on shooting conditions. By switching [FILE] switch, the camera operation is changed immediately. (Refer to the item "7. MODE SETTING BY ON SCREEN DISPLAY.).

6.4 Gain

When the picture image is dark even if the lens iris is open, change the gain (video gain) to get proper video level.

For the gain adjustment of the camera, AUTO (Automatic gain control), MANU (Manual), NORM (0 dB) modes are provided. Select by the [GAIN] switch.

① AUTO

- When the output is low, the gain is automatically adjusted to a suitable video level.
- The maximum value of the gain is 18 dB, possible to be set within 0 – 18 dB in 1 dB step. For the setting method, please refer to the item "7.2 Menus".
- Measurement light area is same as the automatic shutter. (please refer to the item 7.2 (1.1) Changing each setting in AUTO mode".)

② MANU

- Gain adjustment is performed by the GAIN adjusting control.
- The adjusting range is 0 dB to 18 dB.
- When confirming the gain value set, refer to the item "7.2 (2.2) MANU (manual) mode menu".

③ NORM

- Gain is fixed to 0 dB.

6.5 Shading Correction

Due to the lens used or the environmental condition, color shading may occur at the upper and lower side of the screen. In this case, the automatic shading correction can decrease the color shading.

- Turn the SHADING on. When it is off, the automatic shading correction cannot be performed. When changing the setting, refer to the item "7.2 (6.5) Changing shading".
- When the shutter speed mode is set to 1 PULSE or the long period exposure mode, the automatic shading correction cannot be performed.
- Disable the color bar and the characters by pushing the [DISP] button, if necessary.
- Push the [MENU UP] button for approx. 1 second.
- When the automatic shading correction operation starts, the character SHD blinks.
- When the automatic shading correction operation terminates, the character SHD ends blinking and the result is displayed for approx. 1 second.

Display	Meaning
SHD OK	Automatic shading correction operation terminates correctly.
SHD LIMIT	Automatic shading correction operation terminates. However, the most proper value cannot be selected in the correction value range. So the value is set to the most proper value within the correction range.
SHD NG LEVEL NG	Automatic shading correction cannot be performed because the video level is too high or too low. Set the video level properly.
SHD NG NOT AVAILABLE	Automatic shading correction operation cannot be performed because the shutter speed mode is the 1 pulse mode or the long period exposure mode.

The automatic shading correction is effective when the lens iris or zoom ratio is fixed.

Use the camera with SHADING OFF for variable lens conditions.

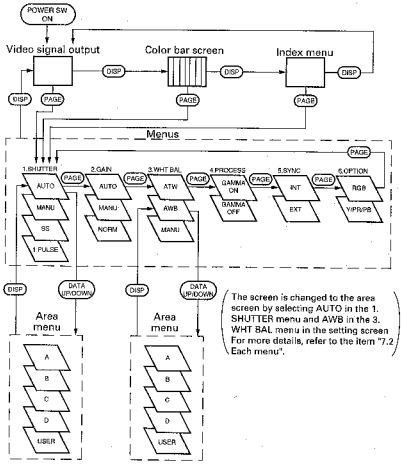
7. MODE SETTING BY ON SCREEN DISPLAY

Various settings can be controlled on the camera by using the on screen menu displayed on the monitor. The contents once set are memorized in the scene files (A, B, C) selected, so if the power turns off, it is unnecessary to set again when using the camera next time. When the setting is performed, select the menu of the item to be set.

7.1 Using the Menus

When the power turns on, the normal screen showing only the video signal appears. Change the output to each screen (video signal output, color bar screen, Index menu, menus, and area menu) by using the [DISP], [PAGE], [MENU UP], and [MENU DOWN] buttons.

(A menu is selected when pushing the [PAGE] button after moving the "→" on the screen by the [MENU UP], [MENU DOWN] button while the Index menu is displayed.)



7.2 Menus

- Select the menu to change the setting by referring the item "7.1 Using the Menu".)
- When the [MENU UP], [MENU DOWN] buttons are pushed, the "→" on the screen moves up and down. Move the "→" to the item to change.

(1) SHUTTER (Electronic shutter)

The electronic shutter has four modes; AUTO, MANU, SS (Syncro. Scan), 1 PULSE.

Move the "→" to one of the modes and push the [DATA UP], [DATA DOWN], and select mode among AUTO, MANU, SS, 1 PULSE.

AUTO ⟷ MANU ⟷ SS ⟷ 1PULSE

AUTO: The exposure time is controlled automatically to obtain the video level set.

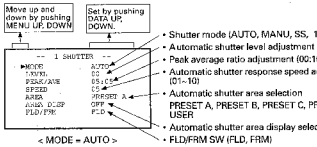
MANU: Possible to select the exposure time among eight kinds of speed; OFF (1/50s), 1/100s, 1/250s, 1/500s, 1/1000s, 1/2000s, 1/4000s, 1/10000s.

Note:
When setting a rapid shutter speed, sensitivity degrades according to the speed. When a discharging light such as fluorescent lamp, etc. is used for the illumination, the flicker may be large.

SS: (Syncro Scan) Shutter speed can be set by the horizontal scanning time (1H) unit or by the frame unit.

1 PULSE: Outputs 1 field picture image by exposing the CCD immediately after the trigger pulse is fed from an external circuit.

(1.1) Changing each setting in AUTO mode


Move up and down by pushing MENU UP, DOWN
Set by pushing DATA UP, DOWN.
-- 1 SHUTTER --
▶MODE AUTO
LEVEL 00
PEAK/AVE 05:05
SPEED 05
AREA PRESET A
AREA DISP OFF
FLD/FRM FLD
• Shutter mode (AUTO, MANU, SS, 1PULSE)
• Automatic shutter level adjustment (-99 ~ 99)
• Peak average ratio adjustment (00:10 ~ 10:00)
• Automatic shutter response speed adjustment (01~10)
• Automatic shutter area selection
PRESET A, PRESET B, PRESET C, PRESET D, USER
• Automatic shutter area display selection
• FLD/FRM SW (FLD, FRM)

< MODE = AUTO >

(a) Changing the video level in the automatic shutter mode.

① Set the "→" to LEVEL by pushing [MENU UP], [MENU DOWN] buttons.

② Set the video level by pushing [DATA UP], [DATA DOWN] buttons.

⟶ The value increases by pushing [DATA UP].

-99 ⟷ 00 ⟷ 99

⟵ The value decreases by pushing [DATA DOWN].

(b) Changing the automatic shutter detection (ratio between peak and average value)

① Set the "→" to PEAK/AVE by pushing [MENU UP], [MENU DOWN] buttons.

② Set the ratio between peak and average value by pushing [DATA UP], [DATA DOWN] buttons.

(Peak : Average value) ⟶ The peak value increases by pushing [DATA UP].

00:10 ⟷ 05:05 ⟷ 10:00

⟵ The peak value decreases by pushing [DATA DOWN].

(c) Changing the automatic shutter response speed

① Set the "→" to SPEED by pushing [MENU UP], [MENU DOWN] buttons.

② Set the response speed by pushing [DATA UP], [DATA DOWN] buttons.

⟶ The response speed becomes quick by pushing [DATA UP].

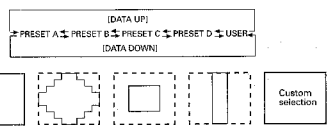
01 ⟷ 05 ⟷ 10

⟵ The response speed becomes slow by pushing [DATA DOWN].

(d) Changing the automatic shutter zone area

① Set the "→" to AREA by pushing [MENU UP], [MENU DOWN] buttons.

② Set the measurement light area by pushing [DATA UP], [DATA DOWN] buttons.



(e) Confirming the contents of the measurement light area selected by the automatic shutter

① Set the "→" to AREA DISP by pushing [MENU UP], [MENU DOWN] buttons.

② Area screen appears by pushing [DATA UP], [DATA DOWN] buttons.

When AREA is set to USER, the setting can be changed on the area menu. When changing the area, refer to the item "7.2 (7) Setting USER area".

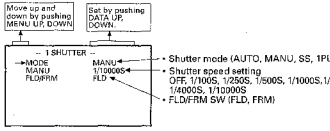
③ Push the [DISP] button to return to the menu.

(f) Changing the CCD storage mode

① Set the "→" to FLD/FRM by pushing [MENU UP], [MENU DOWN] buttons.

② Select either FLD (field) or FRM (frame) by pushing [DATA UP], [DATA DOWN] buttons.

(1.2) Changing each setting in MANU mode



<MODE = MANU>

(a) Changing the shutter speed

① Set the "→" to MANU by pushing [MENU UP], [MENU DOWN] buttons.

② Set the shutter speed by pushing [DATA UP], [DATA DOWN] buttons.

→[DATA UP]

OFF ⇄ 1/100S ⇄ 1/250S ⇄ 1/500S ⇄ 1/1000S ⇄ 1/2000S ⇄ 1/4000S ⇄ 1/10000S

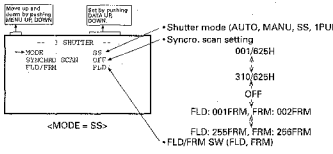
←[DATA DOWN]

(b) Changing CCD storage mode

① Set the "→" to FLD/FRM by pushing [MENU UP], [MENU DOWN] buttons.

② Select either FLD (field) or FRM (frame) by pushing [DATA UP], [DATA DOWN] buttons.

(1.3) Changing each setting in SS (syncro. scan) mode



<MODE = SS>

(a) Changing the shutter speed setting

① Set the "→" to SYNCHRO SCAN by pushing [MENU UP], [MENU DOWN] buttons.

② Select the shutter speed by pushing [DATA UP], [DATA DOWN] buttons.

→[DATA UP]

001/625H ⇄ 310/625H ⇄ OFF ⇄ 001FRM ⇄ 255FRM at FLD
002FRM 256FRM at FRM

←[DATA DOWN]

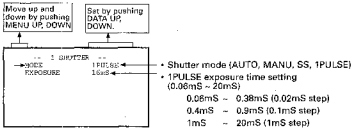
Long time exposure

(b) Changing CCD storage mode

① Set the "→" to FLD/FRM by pushing [MENU UP], [MENU DOWN] buttons.

② Select either FLD (field) or FRM (frame) by pushing [DATA UP], [DATA DOWN] buttons.

(1.4) Changing each setting in 1 PULSE mode


Move up and down by pushing MENU UP, DOWN
Set by pushing DATA UP, DOWN.
-- 1 SHUTTER --
MODE
EXPOSURE
1PULSE
16mS
• Shutter mode (AUTO, MANU, SS, 1PULSE)
• 1PULSE exposure time setting
(0.08mS ~ 20mS)
0.08mS ~ 0.38mS (0.02mS step)
0.4mS ~ 0.9mS (0.1mS step)
1mS ~ 20mS (1mS step)

<MODE = 1PULSE>

(a) Changing 1 PULSE exposure time setting

① Set the "→" to EXPOSURE by pushing [MENU UP], [MENU DOWN] buttons.

② Set the exposure time by pushing [DATA UP], [DATA DOWN] buttons.

→[DATA UP]

0.06mS ⇄ 0.38mS ⇄ 0.4mS ⇄ 0.9mS ⇄ 1mS ⇄ 20mS
(0.02mS step) (0.1mS step) (1mS step)

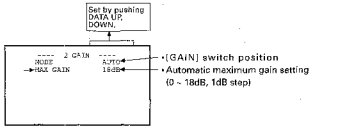
←[DATA DOWN]

(2) GAIN (Video gain)

Display the [GAIN] switch position.

AUTO ⇄ MANU ⇄ NORM

(2.1) Changing the maximum gain in AUTO (Automatic gain control) mode



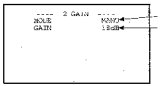
① Set by pushing [DATA UP], [DATA DOWN] buttons.

→The gain increases by pushing [DATA UP].

00dB ⇄ 18dB

←The gain decreases by pushing [DATA DOWN].

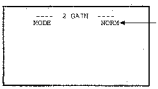
(2.2) MANU (manual) mode menu



- [GAIN] switch position
- Manual gain display (0 ~ 18 dB, 1 dB step)

The GAIN set by the GAIN control is displayed. (Front panel)

(2.3) NORM (0 dB) mode menu



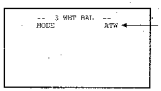
- [GAIN] switch position

(3) WHT BAL (white balance)

[W.B] (white balance) switch position is displayed.

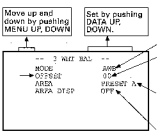
ATW ⟷ AWB ⟷ MANU

(3.1) ATW (Automatic Trace White Balance) mode menu



- [W.B] switch position

(3.2) Changing the AWB (Automatic White Balance) mode setting



- [W.B] switch position
- AWB offset setting (–10 ~ 10)
  +: Orange direction,
  –: Cyan direction
- AWB area
  PRESET A, PRESET B, PRESET C, PRESET D, USER
- AWB area display

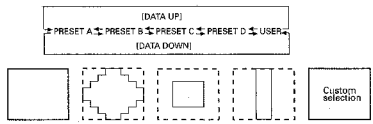
(a) Changing AWB offset (tint)

① Set the "→" to OFFSET by pushing [MENU UP], [MENU DOWN] buttons.
② Set the offset amount by pushing [DATA UP], [DATA DOWN] buttons.

→ Red increases by pushing [DATA UP].
–10 <----> 00 <----> 10
← Blue increases by pushing [DATA DOWN].

(b) Changing AWB zone area

① Set the "→" to AREA by pushing [MENU UP], [MENU DOWN] buttons.
② Select the area by pushing [DATA UP], [DATA DOWN] buttons.



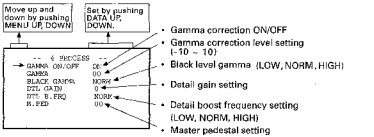
(c) Confirming the contents of the zone area selected by AWB

① Set the "→" to AREA DISP by pushing [MENU UP], [MENU DOWN] buttons.
② Set the screen to area display menu by pushing [DATA UP], [DATA DOWN] buttons.
When the AREA is set to USER, the AREA is set by the area display menu. When setting the area, refer to the item "7.2 (7) Setting the USER area".
③ Push the [DISP] button to return to the menu.

(3.3) MANU (manual) mode menu

- [W.B] switch position

(4) PROCESS (Process)


Move up and down by pushing MENU UP, DOWN
Set by pushing DATA UP, DOWN.
-- 4 PROCESS --
GAMMA ON/OFF ON
GAMMA 00
BLACK GAMMA NORM
DTL GAIN 0
DTL B.FREQ NORM
M.PED 00
• Gamma correction ON/OFF
• Gamma correction level setting (-10 ~ 10)
• Black level gamma (LOW, NORM, HIGH)
• Detail gain setting
• Detail boost frequency setting (LOW, NORM, HIGH)
• Master pedestal setting

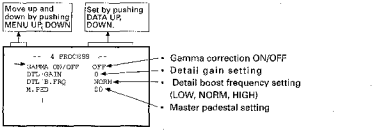
(4.1) Changing the gamma correction ON/OFF

① Set the "→" to GAMMA ON/OFF by pushing [MENU UP], [MENU DOWN] buttons.

② Select either ON or OFF by pushing [DATA UP], [DATA DOWN] buttons.

When ON is selected, menu will show the GAMMA and BLACK GAMMA selections.

When OFF is selected, GAMMA and BLACK GAMMA disappear. So the setting for GAMMA and BLACK GAMMA cannot be made.


Move up and down by pushing MENU UP, DOWN
Set by pushing DATA UP, DOWN.
-- 4 PROCESS --
GAMMA ON/OFF OFF
DTL GAIN 0
DTL B.FREQ NORM
M.PED 00
• Gamma correction ON/OFF
• Detail gain setting
• Detail boost frequency setting (LOW, NORM, HIGH)
• Master pedestal setting

Menu when GAMMA OFF is selected.

(4.2) Changing gamma correction level

① Set the "→" to GAMMA by pushing [MENU UP], [MENU DOWN] buttons.

② Set the gamma correction level by pushing [DATA UP], [DATA DOWN] buttons.

→ Correction amount becomes large.

-10 ←----→ 00 ←----→ 10

← Correction amount becomes small.

(When OFF is selected in GAMMA ON/OFF selection line, the display GAMMA turns off automatically. So the gamma correction level change cannot be changed.)

(4.3) Changing black gamma correction level

① Set the "→" to BLACK GAMMA by pushing [MENU UP], [MENU DOWN] buttons.

② Select black gamma correction by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP]
→ LOW⇄NORM⇄HIGH ←
[DATA DOWN]

(When OFF is selected in GAMMA ON/OFF selection line, the display GAMMA turns off automatically. So the gamma correction level change cannot be changed.)

(4.4) Changing detail (outline) gain

① Set the "→" to DTL GAIN by pushing [MENU UP], [MENU DOWN] buttons.

② Set the detail gain by pushing [DATA UP], [DATA DOWN] buttons.

→ The detail increases by pushing [DATA UP].

-5 ←----→ 00 ←----→ 5
(DTL OFF)

← The detail decreases by pushing [DATA DOWN].

(When DTL OUT ON is selected in OPTION menu, the display DTL GAIN turns off automatically. So DTL GAIN change cannot be performed.)

(4.5) Changing detail boost frequency

① Set the "→" to DTL B.FREQ by pushing [MENU UP], [MENU DOWN] buttons.

② Set the detail boost frequency by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP]
→ LOW⇄NORM⇄HIGH ←
[DATA DOWN]

(4.6) Changing master pedestal

① Set the "→" to M. PED by pushing [MENU UP], [MENU DOWN] buttons.

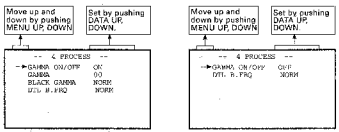
② Set the master pedestal by pushing [DATA UP], [DATA DOWN] buttons.

——→ M.PED rises by pushing [DATA UP].

–50 <----> 00 <----> 50

←—— M. PED decreases by pushing [DATA DOWN].

(When DTL OUT ON is selected in OPTION menu, the display M. PED turns off automatically. So the M. PED change cannot be performed.)


Move up and down by pushing MENU UP, DOWN
Set by pushing DATA UP, DOWN.
Move up and down by pushing MENU UP, DOWN
Set by pushing DATA UP, DOWN.
-- 4 PROCESS --
→GAMMA ON/OFF ON
GAMMA 00
BLACK GAMMA NORM
DTL H-FRQ NORM
-- 4 PROCESS --
→GAMMA ON/OFF ON
DTL H-FRQ NORM

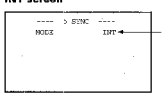
Menu when DTL OUT ON is selected in OPTION menu.

(5) SYNC (sync)

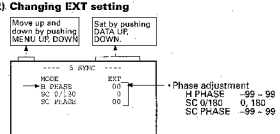
When an external sync signal is input, the display changes from INT (internal sync) to EXT (external sync) automatically.

INT <——> EXT

(5.1) INT screen



(5.2) Changing EXT setting


Move up and down by pushing MENU UP, DOWN
Set by pushing DATA UP, DOWN.
---- 5 SYNC ----
MODE EXT
→H PHASE 00
SC 0/180 0
SC PHASE 00
• Phase adjustment
H PHASE –99 ~ 99
SC 0/180 0, 180
SC PHASE –99 ~ 99

(a) Adjusting horizontal phase

① Set the "→" to H PHASE by pushing [MENU UP], [MENU DOWN] buttons.

② Adjust the horizontal phase by pushing [DATA UP], [DATA DOWN] buttons.

——→ [DATA UP]

–99 <----> 00 <----> 99

←—— [DATA DOWN]

(b) Performing coarse adjustment of sub carrier phase

① Set the "→" to SC 0/180 by pushing [MENU UP], [MENU DOWN] buttons.

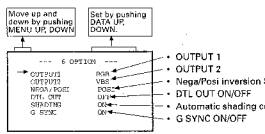
② Select either 0 or 180 by pushing [DATA UP], [DATA DOWN] buttons.

(c) Adjusting sub carrier phase

① Set the "→" to SC PHASE by pushing [MENU UP], [MENU DOWN] buttons.

② Adjust the sub carrier phase by pushing [DATA UP], [DATA DOWN] buttons.

(6) OPTION

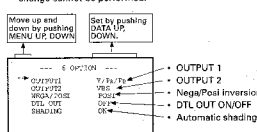


(6.1) Changing OUTPUT 1 output

① Set the "→" to OUTPUT 1 by pushing [MENU UP], [MENU DOWN] buttons.

② Select either RGB or Y/Pr/Pb by pushing [DATA UP], [DATA DOWN] buttons.

When Y/Pr/Pb is selected, the display G SYNC turns off automatically. So G SYNC change cannot be performed.



Menu when selecting Y/Pr/Pb

(6.2) Changing OUTPUT 2 output

① Set the "→" to OUTPUT 2 by pushing [MENU UP], [MENU DOWN] buttons.
② Select either VBS or Y/C by pushing [DATA UP], [DATA DOWN] buttons.

(6.3) Changing Negative/Positive inversion switch

① Set the "→" to NEGA/POSI by pushing [MENU UP], [MENU DOWN] buttons.
② Select either NEGA (negative) or POSI (positive) by pushing [DATA UP], [DATA DOWN] buttons.

(6.4) Changing detail signal output

① Set the "→" to DTL OUT by pushing [MENU UP], [MENU DOWN] buttons.
② Select either ON (detail signal only is output) or OFF (video signal) by pushing [DATA UP], [DATA DOWN] buttons.

(6.5) Changing shading

① Set the "→" to SHADING by pushing [MENU UP], [MENU DOWN] buttons.
② Select either ON or OFF by pushing [DATA UP], [DATA DOWN] buttons.
When ON is selected, the automatic shading correction can be performed by [MENU UP] button. When performing the automatic shading correction, refer to the item "6.5 Shading Correction". (Page 12)

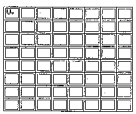
(6.6) Changing G SYNC

① Set the "→" to G SYNC by pushing [MENU UP], [MENU DOWN] buttons.
② Select either ON or OFF by pushing [DATA UP], [DATA DOWN] buttons.
(When Y/Pb/Pb is select, G SYNC disappears.)

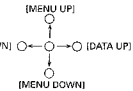
(7) Setting USER area

- When USER is selected for the AREA of the automatic shutter or for AWB, the light measurement zones can be changed.
- The USER area is composed of 64 zones with 8 (vertical) x 8 (horizontal) areas, and each area can be set to ON/OFF.

① Set the output to area menu.
Set the output to the area menu by referring to the item "7.2 (1.1) (e) Confirming the contents of the measurement light area selected by automatic shutter" and "7.2 (3.2) (c) Confirming the contents of the zone area selected by AWB".



② Move the "o" to the zone to be appeared.
The display "o" moves up, down, left and right by pushing [MENU UP], [MENU DOWN], [DATA UP], [DATA DOWN] buttons.



③ Select ON/OFF for the zone.
Select ON (effective) or OFF (ineffective) by pushing [PAGE] button.
When ON is selected, the display "□" appears on the screen and when OFF is selected, "□" turns off.
④ Push [DISP] button to return to the menu.

Note:
When OFF is selected for all 64 division areas, the automatic shutter function and AWB function are not performed correctly. So do not select OFF for all.

(8) Setting to factory setting status

The content set can be returned to the factory default status (preset status) for each file.
① Select a file to set to the factory default status by [FILE] switch.
② Disable the color bar display and the characters by pushing [DISP] button, if necessary.
③ Push [MENU DOWN] and [DATA DOWN] buttons simultaneously for approx. 1 second.
④ When the preset operation starts, the character PRESET blinks.
⑤ When the preset operation finishes, the character PRESET disappears.

7.3 External Sync

When using the camera with an external sync signal, input VBS (composite video signal) or BB (Black Burst) to "EXT. SYNC" terminal on the rear of the camera control unit, or input HD and VD to DC IN/SYNC terminal. When the external sync signal is input, the camera automatically switches its sync from the internal sync to the external sync. When inputting HD and VD, set the HD/VD switch on the rear of the camera control unit to IN.

(1) External sync signal input conditions

VB, BB	: SYNC section	0.3 ± 0.1V
(75Ω unbalenced)	Burst section	0.3 ± 0.1V
HD	: 2 ~ 5V(p-p) Negative	
VD	: 2 ~ 5V(p-p) Negative	

(2) External sync frequency range

For PAL standard frequency: Within ±50ppm

(3) Using the camera with external sync signal

Adjust H (horizontal) phase and SC (sub carrier) phase if necessary to match the output of multiple cameras. When adjusting H (horizontal) phase and SC (sub carrier) phase, refer to the item "7.2 (5.2) Changing EXT setting".

(3.1) H (horizontal) phase adjustment

Observe the external sync signal and the video signal output waveform of the camera with a dual trace oscilloscope, and adjust H phase so that the H phase matches.

(3.2) SC (Sub carrier) phase adjustment

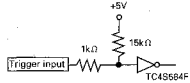
When using the camera with external sync, the sub carrier signal phase of the video output signal of the camera can be adjusted. Perform a coarse adjustment for 0° and 180° in SC 0/180 and then perform a fine adjustment in SC PHASE. Using a vector scope for the phase adjustment will provide more accuracy.

7.4 1 PULSE

Single exposure of the CCD is controlled when inputting the trigger pulse (TRIGGER) from DC IN/SYNC terminal and then output 1 field picture image.

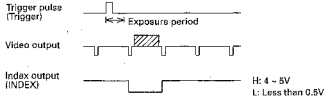
Trigger pulse level:	Low Level	: less than 0.5V, High level: 4 ~ 5V
Trigger signal fetch timing		: Rising period
Trigger pulse width		: More than 2 µs
Trigger pulse interval		: More than 50 µs
Trigger pulse input impedance		: More than 15 kΩ

(Time from trigger pulse input to start of electric charge: Within 2µs)

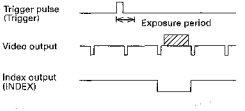


1 PULSE operation timing chart

- When the exposure period is within SYNC interval.



- When the exposure period is over SYNC interval.



7.5 Synchro-Scan Operation

The shutter speed can be set by the horizontal scanning period (1H) or by the frame. Also, CCD integration mode can be set.

(1) Setting by 1H

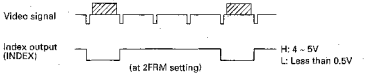
310/625H ~ 001/625H stands for the setting by the 1H and the shutter speed can be set by the 1H (64µs). This function is used for flicker reduction when shooting non-synchronous sources such as VGA monitors.

(2) Setting by the frame

001FRM ~ 255FRM (at field storage) and 002FRM ~ 256FRM (at frame storage) stand for the setting (long period exposure) by the frame.

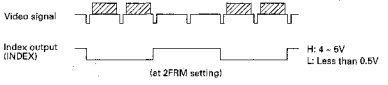
(a) Field storage period

The video signal stored during the frame period set is output as 1 field video image at a frame interval specified.



(b) Frame storage period

The video signal stored during the frame period set is output as 1 frame video image in a frame interval.



8. CAUTIONS ON USE AND INSTALLATION

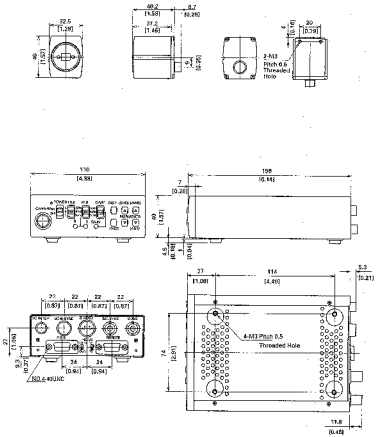
- **Carefully handle the units.**
  Do not drop or give a strong shock or vibration to the camera. This may cause problems. Treat the camera cables carefully to prevent cable problems such as cable breakdown and loosened connections.
- **Do not shoot intense light.**
  If there is an intense light at a location on the screen such as a spot light, a blooming and smearing may occur.
  Do not aim the camera at the sun. If an intense light enters, vertical stripes may appear on the screen.
- **Lens treatment.**
  Do not look at the sun through the lens.
- **Handling of the camera head and protection cap.**
  Keep the camera head and the protection cap away from children. Children may put them into mouth or swallow them accidentally. The protection cap protects the image sensing plane when the lens is removed from the camera head, do not throw away.
- **Do not touch internal parts.**
  Tampering with the internal parts may cause operation failure or injury.
- **Operating ambient temperature and humidity.**
  Do not use the camera in places where temperature and humidity exceed the specifications. Picture quality will lower and internal parts may be damaged.
- **Do not splash water.**
  Install the camera in a location free from water splash. If splashed, turn off the camera power switch and stop supplying power, then consult with your dealer.
- **Install the camera in a location free from noise.**
  If the camera or the cables are located near power utility lines or a TV, etc. undesirable noise may appear on the screen. In such a case, try to change the location of the camera or the cable wiring.
- **When not using the camera for a long-time.**
  Turn off the camera power switch and stop supplying power.
- **Should you notice any trouble.**
  If an abnormality occurs such as no picture obtained, turn the camera power switch off and stop supplying power, then consult with the dealer. Using the camera without checking the cause of the trouble may lead to further damage or unexpected accident.
- **When cleaning the camera**
  Always turn off the power and make a cleaning with a piece of dry cloth. If necessary, gently wipe with a cloth dampened with thinned detergent. Do not use benzine, alcohol, thinner, etc. If used, coating and printed letters may be discolored. When cleaning the lens, use a lens cleaning paper, etc.

9. BEFORE MAKING A SERVICE CALL

Symptom	Items to be checked
No picture	• Is the power supplied correctly? • Is the lens iris adjusted correctly? • Are the cables connected correctly? • Is the shutter mode set correctly?
Poor color	• Is the monitor (TV) adjusted correctly? • Is the white balance of the camera adjusted correctly? (In modes other than automatic trace) • Is the illumination dark? • Is the SC phase adjusted correctly? (External sync)
Noise appears	• Is the camera connector of the camera cable loosened?

10. EXTERNAL APPEARANCE DIAGRAM

Unit: mm (inch)



SECTION 2
ELECTRICAL ADJUSTMENT

1. ELECTRICAL ADJUSTMENT PROCEDURES

<Before Adjustment>

As for the preparation of the adjustments, the required equipments, connection diagrams and initial settings are described in the item 1-1.

The total adjustments containing all adjustment procedures are described in the item 1-2 to overhaul the unit.

Adjust from the beginning to the last step by step. Don't omit any procedure, otherwise the adjustment will be incorrect.

Partial adjustment procedures are shown in the flowchart in the item 1-3. Adjust according to the flowchart, otherwise the adjustment will be incorrect.

1-1. Preparations

1-1-1. Equipment Required

- AC adaptor
- Waveform monitor (WFM)
- Vector scope
- Frequency counter
- Digital voltmeter
- Color monitor
- Plastic chip screwdriver
- Lights (TOSHIBA photo reflector lamp 500W x 2, or a halogen lamp 500W x 2)
- White paper (paper for copy, etc.)
- TU40D extension jig kit (70909441) (used when repairing)

Jig Kit (70909441)

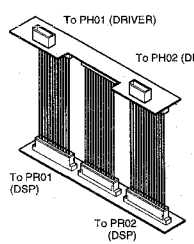


Fig. 1

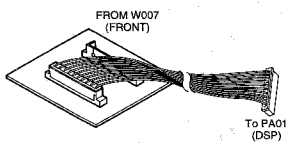


Fig. 2

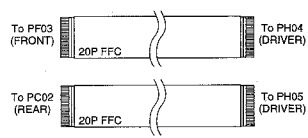


Fig. 3

Fig. 4

1-1-2. Preparation before Adjustment

<Opening the CCU>

1. Remove all connection cables connected to CCU.
2. Turn over the unit.
3. Remove four screws ② fixing the unit cover ①.
4. Pull the mechanical chassis ③ in the arrow direction.

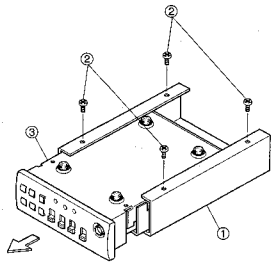


Fig. 5

<Removing the heat sink>

1. Remove two fixing screws ②.
2. Remove the heat sink.

Note: Except for the sub carrier frequency adjustment, it is not necessary to remove the heat sink.

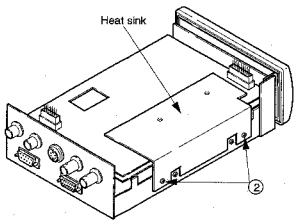


Fig. 6

1-1-3. Equipment Connection Diagram

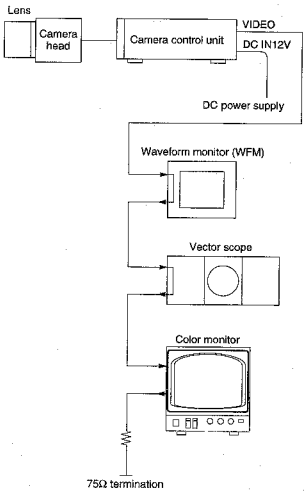


Fig. 7

1-1-4. Initial Setting

1. Perform the warming up for approx. 5 minutes with the POWER switch turned "ON" before performing the adjustments.
2. When the chart is illuminated unevenly, the correct adjustment cannot be performed. So set the light equipments to give an even illumination.

Note: Perform the adjustments in a location with less dust to prevent inside of the camera head from dirty.

1-1-5. Adjusting Locations

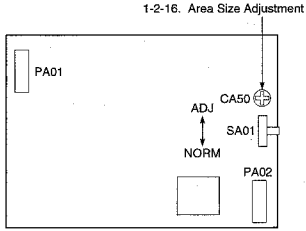


Fig. 8 DSP PC board (Top side)

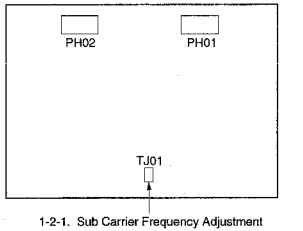


Fig. 9 DRIVER PC board (Bottom side)

1-2. Total Adjustments

The adjustments are required when the unit is overhauled.

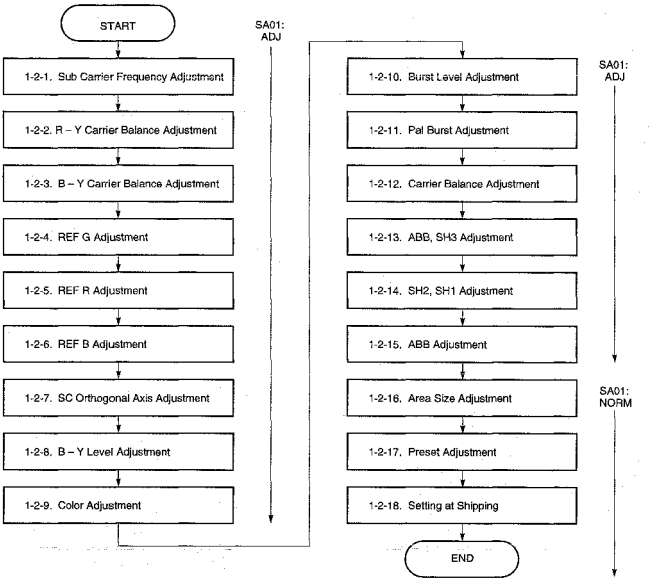
Be sure to perform the adjustments from the beginning to the last. When performing some adjustments separately, perform the adjustments following the flowchart shown in the item 1-3.

When performing the adjustments;

1. Set SA01 on the DSP PC board to ADJ side and enter the unit to the adjusting mode.
2. Push the MENU button (on the front panel) and select the adjusting item.

   Adjust the controls and electrical controls on each PC board. The electrical controls are adjusted by the DATA buttons (on the front panel).

<Flowchart>



1-2-1. Sub Carrier Frequency Adjustment

Screen display: 01 INT SC
Test equipment: Frequency counter
Test point: TJ01/Driver PC board
Adjusting point: DATA UP/DOWN
Specification: 4.433619 MHz ± 10 Hz

Note: External sync mode is not set.

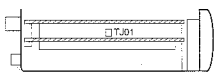


Fig. 10

1-2-2. R – Y Carrier Balance Adjustment

Screen display: 02 R – Y CAR BAL
Test equipment: Vector scope
(MAX GAIN, +V MODE)
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN

1. Set the luminance spot of the vector scope at its center with the DATA buttons.

1-2-3. B – Y Carrier Balance Adjustment

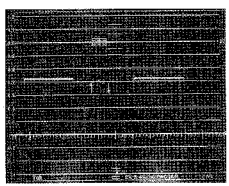
Screen display: 03 B – Y CAR BAL
Test equipment: Vector scope
(MAX GAIN, +V MODE)
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN

1. Set the luminance spot of the vector scope at its center with the DATA buttons.
2. Repeat the items 1-2-2 and 1-2-3 to set the luminance spot to the center of the vector scope.

1-2-4. REF G Adjustment

Screen display: 04 REF G
Test equipment: WFM (LPF mode)
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN
Specification: 60 ± 1 IRE (0.42V ± 7 mV)

1. Adjust the white level of the waveform to 60 ± 1 IRE with the DATA buttons.



1-2-5. REF R Adjustment

Screen display: 05 REF R
Test equipment: Vector scope
(MAX GAIN, +V MODE)
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN

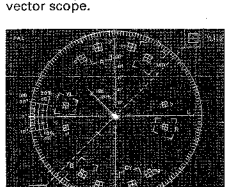
1. Set the luminance spot of the vector scope at its center with the DATA buttons.

Note: The black and white luminance spots appear. Adjust either of the two which is moved by the DATA buttons.

1-2-6. REF B Adjustment

Screen display: 06 REF B
Test equipment: Vector scope
(MAX GAIN, +V MODE)
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN

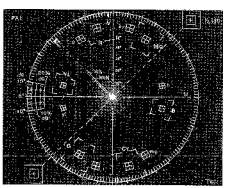
1. Set the luminance spot of the vector scope at its center with the DATA buttons.
2. Repeat the items 1-2-5 and 1-2-6, and set the luminance spot to the center of the vector scope.



1-2-7. SC Orthogonal Axis Adjustment

Screen display: 07 SC 90
Test equipment: Vector scope
(VAR GAIN, +V MODE)
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN

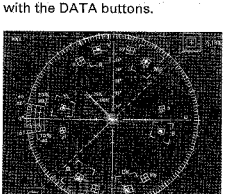
1. Set the burst signals close to circumference scale for precise adjustment with GAIN control of the vector scope.
2. Overlap the two burst signals with the DATA buttons.



1-2-8. B – Y Level Adjustment

Screen display: 08 B – Y LEVEL
Test equipment: Vector scope (+V MODE)
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN

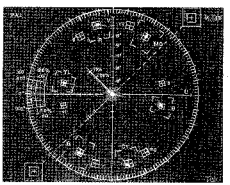
1. Overlap the burst signal on B – Y axis with the PHASE control of the vector scope.
2. Adjust the R luminance spot to set it within the mark ⊞ with the GAIN control of the vector scope.
3. Adjust each color luminance spot (YL, CY, G, MG, R, B) to set it within each mark ⊞ with the DATA buttons.



1-2-9. Color Adjustment

Screen display: 09 CHR LEVEL
Test equipment: Vector scope (+V MODE)
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN

1. Adjust the R luminance spot to set it within the mark ⊞ with the DATA buttons.



1-2-10. BurstLlevel Adjustment

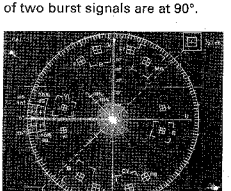
Screen display: 10 BURST LEVEL
Test equipment: WFM (BPF mode),
Vector scope
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN

1. Adjust the burst level to 75% position of the vector scope with the DATA buttons.
   Or, adjust the burst level of the waveform monitor to 43 ± 1 (0.4V ± 7 mV) IRE with the DATA buttons.

1-2-11. Pal Burst Adjustment

Screen display: 11 PAL BURST
Test equipment: Vector scope (PAL MODE)
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN

1. Set the burst signals close to circumference scale for precise adjustment with GAIN control of the vector scope.
2. Overlap the two burst signals on R–Y and B–Y axes with PHASE control of the vector scope and DATA buttons, so that the angle of two burst signals are at 90°.



1-2-12. Carrier Balance Adjustment

Screen display: 12 R – Y CAR BAL
13 B – Y CAR BAL
Test equipment: Vector scope (MAX GAIN)
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN

1. When the luminance spot is out of the center position of the vector scope, set the luminance spot to its center with the DATA buttons. (Display 12 R – Y CAR BAL and 13B – Y CAR BAL repeatedly.)

1-2-13. ABB, SH3 Adjustment

Screen display: 14 ABB

1. Set the lens iris to close.
2. Push the DATA buttons.
3. The automatic black balance adjustment is performed automatically and "ABB OK" is displayed on the screen.
4. When "ABB OK" is displayed, SH3 adjustment is performed automatically.
5. After completing the SH3 adjustment, "SH3 OK" is displayed on the screen.
6. When "SH3 OK" is displayed, the screen display shows "16 SH2" automatically.

1-2-14. SH2, SH1 Adjustment

Screen display: 16 SH2
Test equipment: WFM (LPF mode)
Test point: VIDEO OUT

1. Shoot the white object fully on the screen.
2. Adjust the white level to obtain 70 ± 3 IRE (0.49V ± 21 mV) with the lens iris.
3. Push the DATA buttons.
4. SH2 adjustment is performed automatically, and "SH2 OK" is displayed on the screen.
5. When "SH2 OK" is displayed, SH1 adjustment is performed automatically.
6. After completing the SH1 adjustment, "SH1 OK" is displayed on the screen.
7. When "SH1 OK" is displayed, "18 HEAD R/B" is automatically displayed on the screen.

Note: Through the adjustment described above, do not change the shooting condition. (Do not move the camera and the object.)

1-2-15. ABB Adjustment

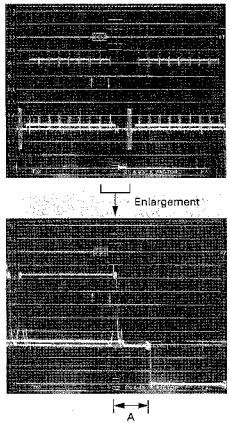
Screen display: 19 ABB

1. Set the lens iris to close.
2. Push the DATA buttons.
3. The automatic black balance adjustment is performed automatically, and "ABB OK" is displayed on the screen.

1-2-16. Area Size Adjustment

Test equipment: WFM (1 µs mode)
Test point: VIDEO OUT
Adjusting point: CA50/DSP PC board
Specification: 2.0 µs ± 300 ns

1. Set SA01 on the DSP PC board to NORM side.
2. Set the lens iris to close.
3. Push the DISP button twice to display the INDEX screen.
4. Push the PAGE button to display the SHUTTER screen.
5. Set the MODE to AUTO with the DATA buttons.
6. Set the "→" cursor to AREA position with the MENU DOWN button and set to PRESET A with the DATA buttons.
7. Set the "→" cursor to AREA DISP position with the MENU DOWN button.
8. Set the screen to the AREA screen by pushing the DATA buttons.
9. Adjust the portion A to obtain 2.0 µs ± 300 ns by adjusting CA50.
10. Push the DISP button twice to erase the screen.



1-2-17. Preset Adjustment

1. Set the FILE switch to A.
   Disable color bar pattern or character display by pushing the DISP button if necessary.
2. Push the MENU DOWN button and DATA DOWN button simultaneously for more than 1 second.
3. The preset operation starts and "PRESET" on the display blinks.
4. After completing the preset operation, "PRESET" on the display disappears.
5. Set the FILE switch to B.
6. Perform the same steps as 2 ~ 4.
7. Set the FILE switch to C.
8. Perform the same steps as 2 ~ 4.

1-2-18. Setting at Shipping

POWER (FRONT)	: OFF
FILE (FRONT)	: A
W.B. (FRONT)	: ATW
GAIN (FRONT)	: NORM
HD/VD (REAR)	: IN/75Ω
R control (FRONT)	: Mechanical center
B control (FRONT)	: Mechanical center
GAIN control (FRONT)	: Counterclockwise fully

1-3. Partial Adjustments

In this chapter, the adjustments required relatively frequently are selected and associated items to be checked previously or to be adjusted before or after the adjustments are given in the flowchart below.

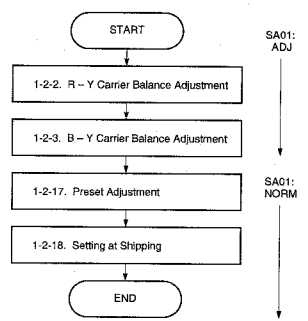
Be sure to perform the adjustments following to the flowchart.

Items shown within the frame:

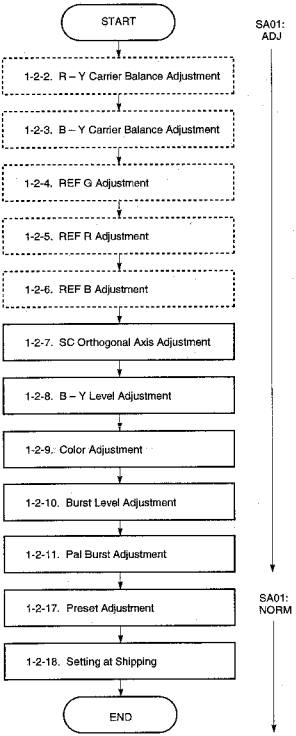
Confirm and adjust if the specification is out of its range.

This adjustment is always required.

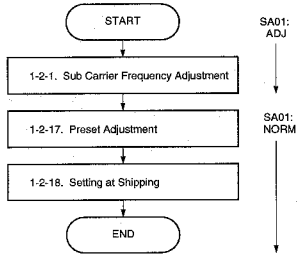
1-3-1. Carrier Balance Adjustment



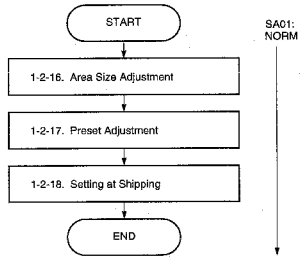
1-3-2. Color Bar Adjustment



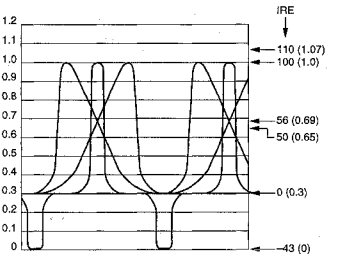
1-3-3. Sub Carrier Frequency Adjustment



1-3-4. Area Size Adjustment



1-4. Waveform Monitor Screen & IRE Value



SECTION 3
EXPLODED VIEWS AND PARTS LIST

SAFETY PRECAUTION

The parts identified by ⚠ mark are critical for safety. Replace only with part number specified.
The mounting position of replacement is to be identical with originals.
The substitute replacement parts which do not have the same safety characteristics are specified in the parts list may create shock, fire or other hazards.

NOTICE

The part number must be used when ordering parts in order to assist in processing, be sure to include the model number and description.
Parts marked # are of chip type and mounted on original PC boards.
However, when they are placed for servicing works, use discrete parts listed on the parts list.

ABBREVIATIONS

1. **Integrated Circuit (IC)**
2. **Capacitor (Cap)**
   - **Unit**
     F ..... farad
     μF ..... microfarad (μF = 10^{-6} F)
     pF ..... picofarad (pF = 10^{-6} μF = 10^{-12} F)
   - **Capacitance Tolerance (for Nominal Capacitance more than 10pF)**

Symbol	B	C	D	F	G	J	K	M	N
Tolerance %	± 0.1	± 0.25	± 0.5	± 1	± 2	± 5	± 10	± 20	± 30

Symbol	P	Q	T	U	V	W	X	Y	Z
Tolerance %	+ 100 0	+ 30 −10	+ 50 −10	+ 75 −10	+ 20 −10	+ 100 −10	+ 40 −20	+ 150 −10	+ 80 −20

Ex. 10μF J = 10μF ± 5%

   - **Capacitance Tolerance (for Nominal Capacitance 10pF or less)**

Symbol	B	C	D	F	G
Tolerance pF	± 0.1	± 0.25	± 0.5	± 1	± 2

Ex. 10pF G = 10pF ± 2pF

3. **Resistor (Res)**
   - **Unit**
     No Mark ..... Ω
     k ..... kΩ
     M ..... MΩ
     W ..... Watt

     Ex.
     10 ..... 10Ω
     10k 10kΩ
     10M 10MΩ
     1W ..... 1 Watt

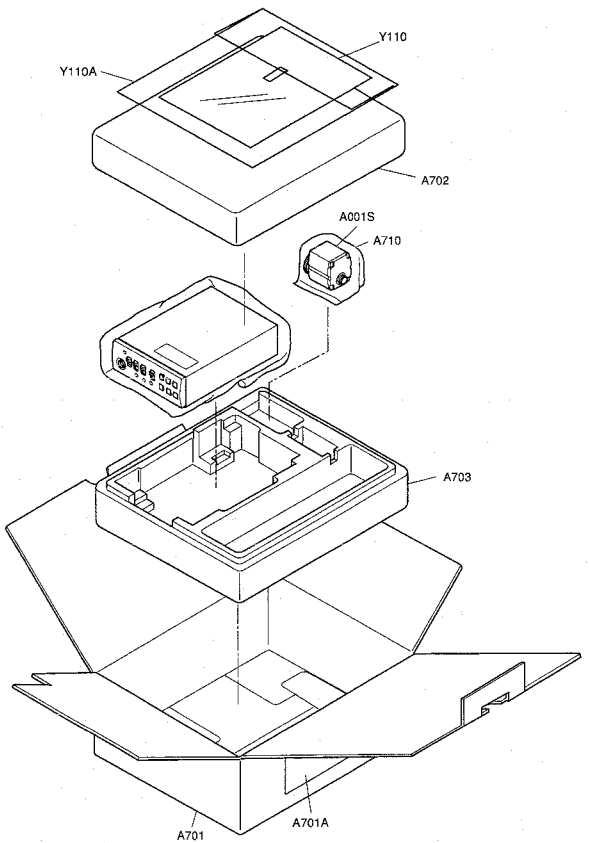
   - **Resistance Tolerance**

Symbol	B	C	D	F	G	J	K	M
Tolerance %	± 0.1	± 0.25	± 0.5	± 1	± 2	± 5	± 10	± 20

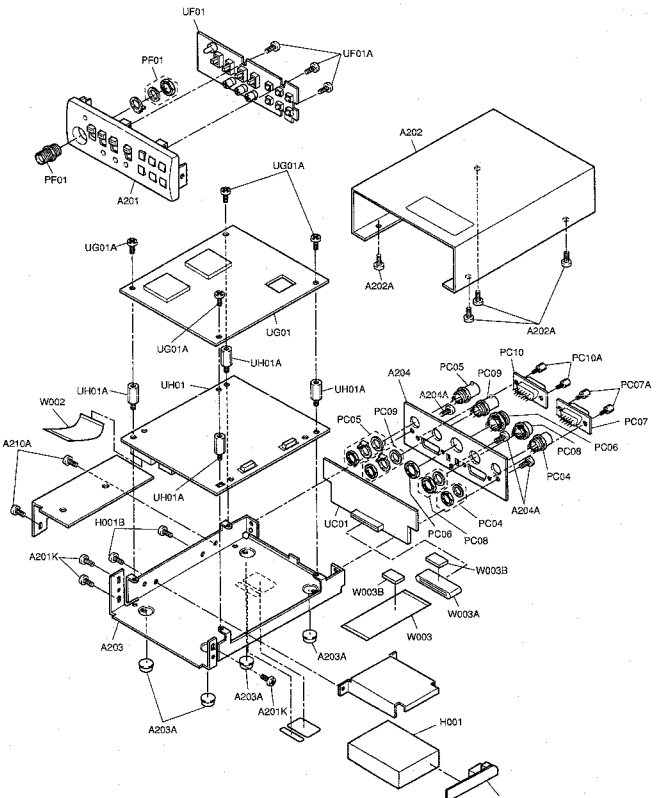
Ex. 470 J = 470Ω ± 5%

1. EXPLODED VIEWS

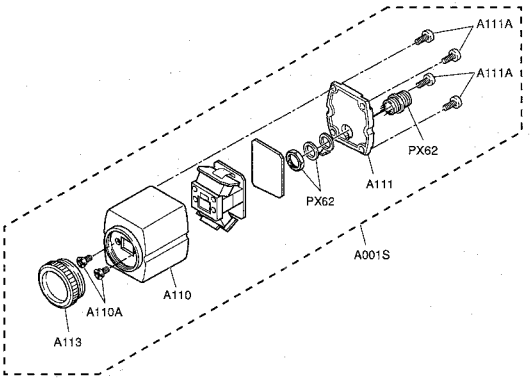
1-1. Packing Assembly



1-2. Chassis Assembly


UF01
UF01A
PF01
PF01
A201
A202
A202A
A202A
UG01A
UG01A
UG01A
UG01
UH01A
UH01A
UH01A

1-3. Camera Head Assembly



2. PARTS LIST

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
		- ELECTRICAL PARTS -	
■ UC01	70186721	P C Board Assy	REAR(PB6708-2)
		- DIODES -	
DC01	70115496	Diode	RD6.2Z
DC02	70115496	Diode	RD6.2Z
DC03	70115496	Diode	RD6.2Z
DC04	70115496	Diode	RD6.2Z
DC05	70115496	Diode	RD6.2Z
DC06	70115496	Diode	RD6.2Z
DC07	70115496	Diode	RD6.2Z
DC08	70115496	Diode	RD6.2Z
DC09	23316244	Diode	SFPB-54V
DC10	23316244	Diode	SFPB-54V
DC11	70115496	Diode	RD6.2Z
DC12	70115496	Diode	RD6.2Z
DC13	70115496	Diode	RD6.2Z
DC14	70115496	Diode	RD6.2Z
DC15	70115496	Diode	RD6.2Z
DC16	23118263	Diode, Chip	RD30M
DC17	23118263	Diode, Chip	RD30M
DC18	23118263	Diode, Chip	RD30M
DC19	23118263	Diode, Chip	RD30M
DC20	23118263	Diode, Chip	RD30M
DC21	23118263	Diode, Chip	RD30M
DC22	23118263	Diode, Chip	RD30M
DC23	23118263	Diode, Chip	RD30M
DC24	23118263	Diode, Chip	RD30M
DC25	23118263	Diode, Chip	RD30M
DC26	23118263	Diode, Chip	RD30M
DC27	23118263	Diode, Chip	RD30M
		- CAPACITORS -	
CC01	24088979	Cap, Chip, Tantalum	1μF M 25V
		- RESISTORS -	
RC01	24988102	Res, Chip	1k D 1/16W
RC02	24988102	Res, Chip	1k D 1/16W
RC03	24988750	Res, Chip	75 D 1/16W
RC04	24988750	Res, Chip	75 D 1/16W
RC05	24988750	Res, Chip	75 D 1/16W
		- MISCELLANEOUS -	
PC02	70154750	Connector, 20P	
SC01	70145448	Switch, Slide	2C2P
SC02	70145448	Switch, Slide	2C2P
⚠ ZC01	70144821	Protector	SSTC 2A
■ UG01	70186720	P C Board Assy	DSP(PB6708-1)
		- INTEGRATED CIRCUITS -	
QA01	80488611	IC	TC74VHC74FS
QA02	70200199	IC	UPD4723GS-GJG
QA03	80489780	IC	TC74VHC32FS
QA04	A6030820	IC	TCTS04F
QA05	70129347	IC	MB88346BPFV
QA06	80489617	IC	TC74VHC04FS
QA07	70200499	IC	UPD6453C15GS
QA08	70200404	IC	M66MB041FP
QA09	70200497	IC	TMP80PM40F
QA10	70119541	IC	S-8054ALR
QA11	80489617	IC	TC74VHC541FS
QB01	70200095	IC	AD813AR-14
QB02	70200185	IC	MPT652AS
QB03	70200007	IC	NJM064V
QB04	A6030110	IC	TC4S66F
QB05	A6030110	IC	TC4S66F
QB06	70200253	IC	CXD2310AR
QB07	70200185	IC	MN6557AS
QB01	70200095	IC	AD813AR-14
QB02	70200185	IC	MPT652AS
QB03	70200007	IC	NJM064V
QB04	A6030110	IC	TC4S66F
QB05	A6030110	IC	TC4S66F
QB06	70200253	IC	CXD2310AR
QB07	70200188	IC	MN6557AS
QR01	70200095	IC	AD813AR-14
QR02	70200185	IC	MPT652AS
QR03	70200007	IC	NJM064V

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
QR04	A6030110	IC	TC4S66F
QR05	A6030110	IC	TC4S66F
QR06	70200253	IC	CXD2310AR
QR07	70200186	IC	MN6557AS
QS01	B0487626	IC	TC74HC4053AFS
QS02	70200006	IC	NJM082V
QS03	70200203	IC	CXA1521M
QS04	B0487626	IC	TC74HC4053AFS
QS05	A6030820	IC	TCTS08F
QS06	70200006	IC	NJM082V
QS07	B0487132	IC	TC74VHC574FS
QS08	B0489617	IC	TC74VHC541FS
QS09	B0488921	IC	TC74AC04FS
QS10	70200360	IC	HN27C1024HCP
QS11	B0489617	IC	TC74VHC541FS
QS12	B0489617	IC	TC74VHC541FS
QS13	B0485060	IC	TC74VHCT541FS
QS14	B0489617	IC	TC74VHC541FS
QS17	60486025	IC	TC74VHCT540FS
QS18	70200009	IC	AD813AR-14
QS19	70200007	IC	NJM064V
QS20	B0487626	IC	TC74HC4053AFS
		- TRANSISTORS -	
QB21	T0114340	Transistor, Chip	UPA674T
QB22	23314558	Transistor, Chip	2SA1610
QB23	23314558	Transistor, Chip	2SA1610
QB24	23314894	Transistor, Chip	XN5531
QB25	23314507	Transistor, Chip	2SC3931-C
QB26	23314507	Transistor, Chip	2SC3931-C
QB27	T0114329	Transistor, Chip	UPA673T
QB28	A6365620	Transistor, Chip	2SC4116-Y
QC21	T0114340	Transistor, Chip	UPA674T
QC22	23314558	Transistor, Chip	2SA1610
QC23	23314558	Transistor, Chip	2SA1610
QC24	23314894	Transistor, Chip	XN5531
QC25	23314507	Transistor, Chip	2SC3931-C
QC26	23314507	Transistor, Chip	2SC3931-C
QC27	T0114329	Transistor, Chip	UPA673T
QC28	A6365620	Transistor, Chip	2SC4116-Y
QR21	T0114340	Transistor, Chip	UPA674T
QR22	23314558	Transistor, Chip	2SA1610
QR23	23314558	Transistor, Chip	2SA1610
QR24	23314894	Transistor, Chip	XN5531
QR25	23314507	Transistor, Chip	2SC3931-C
QR26	23314507	Transistor, Chip	2SC3931-C
QR27	T0114329	Transistor, Chip	UPA673T
QR28	A6365620	Transistor, Chip	2SC4116-Y
QS31	A6365620	Transistor, Chip	2SC4116-Y
QS32	23314358	Transistor, Chip	XN6401
QS33	23314335	Transistor, Chip	UN5112
QS34	23314558	Transistor, Chip	2SA1610
		- DIODES -	
DB01	23118041	Diode, Chip	MA111
DB01	23118041	Diode, Chip	MA111
DB02	23118041	Diode, Chip	MA111
DR01	23118041	Diode, Chip	MA111
		- COILS -	
LA01	23245837	Coil, Chip	39μH
LA02	23245847	Coil, Chip	33μH
LA03	23245847	Coil, Chip	33μH
LB01	23245859	Coil, Chip	15μH
LB02	23245859	Coil, Chip	15μH
LG01	23245859	Coil, Chip	15μH
LG02	23245859	Coil, Chip	15μH
LR01	23245859	Coil, Chip	15μH
LR02	23245859	Coil, Chip	15μH
LS01	23245859	Coil, Chip	15μH
LS02	23245859	Coil, Chip	15μH
LS03	23245859	Coil, Chip	15μH
LS04	23245861	Coil, Chip	150μH
LS05	23245849	Coil, Chip	100μH
		- CAPACITORS -	
CA02	24088605	Cap, Chip, Tantalum	6.8μF M 6.3V
CA04	24105300	Cap, Chip, Ceramic	30pF J 50V
CA05	24088973	Cap, Chip, Tantalum	15μF M 6.3V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
CA06	24105300	Cap, Chip, Ceramic	39pF	J 50V
CA07	24105300	Cap, Chip, Ceramic	39pF	J 50V
CA08	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CA09	24088964	Cap, Chip, Tantalum	4.7 µF	M 20V
CA10	24088964	Cap, Chip, Tantalum	4.7 µF	M 20V
CA11	24088964	Cap, Chip, Tantalum	4.7 µF	M 20V
CA12	24088964	Cap, Chip, Tantalum	4.7 µF	M 20V
CA13	24100104	Cap, Chip	0.1 µF	Z 25V
CA14	24100104	Cap, Chip	0.1 µF	Z 25V
CA15	24100104	Cap, Chip	0.1 µF	Z 25V
CA16	24100104	Cap, Chip	0.1 µF	Z 25V
CA17	24100104	Cap, Chip	0.1 µF	Z 25V
CA18	24100104	Cap, Chip	0.1 µF	Z 25V
CA19	24100104	Cap, Chip	0.1 µF	Z 25V
CA20	24100104	Cap, Chip	0.1 µF	Z 25V
CA21	24100104	Cap, Chip	0.1 µF	Z 25V
CA22	24100104	Cap, Chip	0.1 µF	Z 25V
CA23	24100104	Cap, Chip	0.1 µF	Z 25V
CA24	24100104	Cap, Chip	0.1 µF	Z 25V
CA25	24100104	Cap, Chip	0.1 µF	Z 25V
CA26	24051805	Cap, Chip, Ceramic	180pF	J 50V
CA27	24105820	Cap, Chip, Ceramic	82pF	J 50V
CA50	24083917	Cap, Chip, Variable	20pF	
CB03	24082178	Cap, Chip, Ceramic	0.1 µF	K 25V
CB04	24082441	Cap, Chip, Ceramic	1 µF	Z 16V
CB05	24100104	Cap, Chip	0.1 µF	Z 25V
CB06	24082441	Cap, Chip, Ceramic	1 µF	Z 16V
CB07	24088949	Cap, Chip, Tantalum	2.2 µF	M 16V
CB08	24088966	Cap, Chip, Tantalum	10 µF	M 4V
CB10	24296104	Cap, Chip, Tantalum	0.1 µF	M 35V
CB11	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB12	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB13	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB14	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CB15	24088966	Cap, Chip, Tantalum	10 µF	M 4V
CB16	24100103	Cap, Chip, Ceramic	0.01 µF	K 25V
CB17	24100104	Cap, Chip	0.1 µF	K 25V
CB18	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CB19	24092178	Cap, Chip, Ceramic	0.1 µF	K 25V
CB20	24088979	Cap, Chip, Tantalum	1 µF	M 25V
CB21	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CB22	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CB23	24088906	Cap, Chip, Tantalum	4.7 µF	M 10V
CB24	24092176	Cap, Chip, Ceramic	0.1 µF	K 25V
CB25	24092176	Cap, Chip, Ceramic	0.1 µF	K 25V
CB03	24092176	Cap, Chip, Ceramic	0.1 µF	K 25V
CB04	24092441	Cap, Chip, Ceramic	1 µF	Z 16V
CB05	24100104	Cap, Chip	0.1 µF	Z 25V
CB06	24092441	Cap, Chip, Ceramic	1 µF	Z 16V
CB07	24088949	Cap, Chip, Tantalum	2.2 µF	M 16V
CB08	24088966	Cap, Chip, Tantalum	10 µF	M 4V
CB10	24296104	Cap, Chip, Tantalum	0.1 µF	M 35V
CB11	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB12	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB13	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB14	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CB15	24088966	Cap, Chip, Tantalum	10 µF	M 4V
CB16	24100103	Cap, Chip, Ceramic	0.01 µF	K 25V
CB17	24100104	Cap, Chip	0.1 µF	K 25V
CB18	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CB19	24092178	Cap, Chip, Ceramic	0.1 µF	K 25V
CB20	24088979	Cap, Chip, Tantalum	1 µF	M 25V
CB21	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CB22	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CB23	24088906	Cap, Chip, Tantalum	4.7 µF	M 10V
CB24	24092176	Cap, Chip, Ceramic	0.1 µF	K 25V
CB25	24092178	Cap, Chip, Ceramic	0.1 µF	K 25V
CB03	24092178	Cap, Chip, Ceramic	0.1 µF	K 25V
CB04	24092441	Cap, Chip, Ceramic	1 µF	Z 16V
CB05	24100104	Cap, Chip	0.1 µF	Z 25V
CB06	24092441	Cap, Chip, Ceramic	1 µF	Z 16V
CB07	24088949	Cap, Chip, Tantalum	2.2 µF	M 16V
CB09	24088966	Cap, Chip, Tantalum	10 µF	M 4V
CB10	24296104	Cap, Chip, Tantalum	0.1 µF	M 35V
CB11	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
CB12	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB13	24088913	Cap, Chip, Tantalum	15 µF	M 6.3V
CB14	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CB15	24088966	Cap, Chip, Tantalum	10 µF	M 4V
CB16	24092178	Cap, Chip, Ceramic	0.01 µF	K 25V
CB17	24100104	Cap, Chip	0.1 µF	Z 25V
CB18	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CB19	24092178	Cap, Chip, Ceramic	0.1 µF	K 25V
CB20	24088979	Cap, Chip, Tantalum	1 µF	M 25V
CB21	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CB22	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CB23	24088906	Cap, Chip, Tantalum	4.7 µF	M 10V
CB24	24092178	Cap, Chip, Ceramic	0.1 µF	K 25V
CB25	24092178	Cap, Chip, Ceramic	0.1 µF	K 25V
CB26	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB27	24088966	Cap, Chip, Tantalum	10 µF	M 4V
CB28	24092178	Cap, Chip, Ceramic	0.1 µF	K 25V
CB29	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB30	24088966	Cap, Chip, Tantalum	10 µF	M 4V
CB31	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CB32	24088966	Cap, Chip, Tantalum	10 µF	M 4V
CB33	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB34	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB35	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB36	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB37	24088966	Cap, Chip, Tantalum	10 µF	M 4V
CB38	24088966	Cap, Chip, Tantalum	10 µF	M 4V
CB39	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB40	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB41	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB42	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB43	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB44	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB45	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB46	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB47	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB48	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB49	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB50	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB51	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB52	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB53	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB54	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB55	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB56	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB57	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB58	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB59	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB60	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB61	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB62	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB63	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB64	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB65	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB66	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB67	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB68	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB69	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB70	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB71	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB72	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB73	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB74	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB75	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB76	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB77	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB78	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB79	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB80	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB81	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB82	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB83	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB84	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB85	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB86	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB87	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB88	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB89	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB90	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB91	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB92	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB93	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB94	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB95	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB96	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB97	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB98	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CB99	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC01	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC02	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC03	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC04	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC05	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC06	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC07	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC08	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC09	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC10	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC11	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC12	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC13	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC14	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC15	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC16	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC17	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC18	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC19	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC20	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC21	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC22	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC23	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC24	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC25	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC26	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC27	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC28	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC29	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC30	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC31	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC32	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC33	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC34	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC35	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC36	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC37	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC38	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC39	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC40	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC41	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC42	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC43	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC44	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC45	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC46	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC47	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC48	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC49	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC50	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC51	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC52	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC53	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC54	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC55	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC56	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC57	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC58	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC59	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC60	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC61	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC62	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC63	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC64	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC65	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC66	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC67	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC68	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC69	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC70	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC71	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC72	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC73	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC74	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC75	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC76	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC77	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC78	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC79	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC80	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC81	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC82	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC83	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC84	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC85	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC86	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC87	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC88	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC89	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC90	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC91	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC92	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC93	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC94	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC95	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC96	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC97	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC98	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CC99	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD01	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD02	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD03	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD04	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD05	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD06	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD07	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD08	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD09	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD10	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD11	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD12	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD13	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD14	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD15	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD16	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD17	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD18	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD19	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD20	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD21	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD22	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD23	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD24	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD25	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD26	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD27	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD28	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD29	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD30	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD31	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD32	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD33	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD34	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD35	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD36	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD37	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD38	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD39	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD40	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD41	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD42	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD43	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD44	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD45	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD46	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD47	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD48	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD49	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD50	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD51	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD52	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD53	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD54	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD55	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD56	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD57	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD58	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD59	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD60	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD61	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD62	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD63	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD64	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD65	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD66	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD67	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD68	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD69	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD70	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD71	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD72	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD73	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD74	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD75	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD76	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD77	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD78	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD79	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD80	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD81	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD82	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD83	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD84	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD85	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD86	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD87	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD88	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD89	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD90	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD91	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD92	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD93	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD94	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD95	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD96	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD97	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD98	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CD99	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CR12	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CR13	24088913	Cap, Chip, Tantalum	15 µF	M 6.3V
CR14	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CR15	24088966	Cap, Chip, Tantalum	10 µF	M 4V
CR16	24105103	Cap, Chip, Ceramic	0.01 µF	K 25V
CR17	24100104	Cap, Chip	0.1 µF	Z 25V
CR18	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CR19	24092178	Cap, Chip, Ceramic	0.1 µF	K 25V
CR20	24088979	Cap, Chip, Tantalum	1 µF	M 25V
CR21	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CR22	24088905	Cap, Chip, Tantalum	6.8 µF	M 6.3V
CR23	24088906	Cap, Chip, Tantalum	4.7 µF	M 10V
CR24	24092178	Cap, Chip, Ceramic	0.1 µF	K 25V
CR25	24092178	Cap, Chip, Ceramic	0.1 µF	K 25V
CR26	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CS21	24088966	Cap, Chip, Tantalum	10 µF	M 4V
CS04	24092178	Cap, Chip, Ceramic	0.1 µF	K 25V
CS05	24088966	Cap, Chip, Tantalum	10 µF	M 4V
CS06	24109471	Cap, Chip, Ceramic	470pF	K 50V
CS07	24088906	Cap, Chip, Tantalum	10 µF	M 4V
CS08	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CS09	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CS10	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CS11	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CS12	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CS13	24100104	Cap, Chip	0.1 µF	Z 25V
CS14	24100104	Cap, Chip	0.1 µF	Z 25V
CS15	24088973	Cap, Chip, Tantalum	15 µF	M 6.3V
CS16	24100104	Cap, Chip	0.1 µF	Z 25V
CS17	24100104	Cap, Chip	0.1 µF	Z 25V
CS18	24088979	Cap, Chip, Tantalum	1 µF	M 25V
CS20	24092441	Cap, Chip, Ceramic	1 µF	Z 16V
CS29	24092441	Cap, Chip, Ceramic	1 µF	Z 16V
		- RESISTORS -		
RA01	24098472	Res, Chip	4.7k	D 1/16W
RA02	24998102	Res, Chip	1k	D 1/16W
RA03	24998102	Res, Chip	1k	D 1/16W
RA04	24998103	Res, Chip	1k	J 1/16W
RA05	24000565	Res, Block	15kX4	J 1/16W
RA06	24000565	Res, Block	15kX4	J 1/16W
RB01	24998101	Res, Chip	100	D 1/16W
RB02	24998513	Res, Chip	51k	D 1/16W
RB04	24998681	Res, Chip	680	D 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RB46	24998473	Res, Chip	47k	D 1/16W
RB47	24998103	Res, Chip	1k	D 1/16W
RB48	24998220	Res, Chip	22	D 1/16W
RB60	24998822	Res, Chip	8.2k	D 1/16W
RB61	24998123	Res, Chip	12k	D 1/16W
RB62	24998393	Res, Chip	39k	D 1/16W
RB63	24998750	Res, Chip	75	D 1/16W
RB64	24998152	Res, Chip	1.5k	D 1/16W
RB65	24998102	Res, Chip	1k	D 1/16W
RB66	24998103	Res, Chip	1k	D 1/16W
RB67	24998103	Res, Chip	1k	D 1/16W
RB68	24998682	Res, Chip	6.8k	D 1/16W
RB70	24998102	Res, Chip	1k	D 1/16W
RB71	24998122	Res, Chip	1.2k	D 1/16W
RB72	24998332	Res, Chip	3.3k	D 1/16W
RB73	24998471	Res, Chip	470	D 1/16W
RB74	24998752	Res, Chip	7.5k	D 1/16W
RB75	24998362	Res, Chip	3.6k	D 1/16W
RB76	24998681	Res, Chip	680	D 1/16W
RG01	24998101	Res, Chip	100	D 1/16W
RG02	24998513	Res, Chip	51k	D 1/16W
RG03	24998101	Res, Chip	100	D 1/16W
RG04	24998751	Res, Chip	750	D 1/16W
RG05	24998821	Res, Chip	820	D 1/16W
RG06	24998182	Res, Chip	1.8k	D 1/16W
RG08	24998152	Res, Chip	1.5k	D 1/16W
RG12	24998512	Res, Chip	5.1k	D 1/16W
RG13	24998681	Res, Chip	680	D 1/16W
RG14	24998122	Res, Chip	1.2k	D 1/16W
RG15	24998512	Res, Chip	5.1k	D 1/16W
RG17	24998681	Res, Chip	680	D 1/16W
RG18	24998122	Res, Chip	1.2k	D 1/16W
RG19	24998153	Res, Chip	15k	D 1/16W
RG20	24998201	Res, Chip	200	D 1/16W
RG21	24998512	Res, Chip	5.1k	D 1/16W
RG23	24998222	Res, Chip	2.2k	D 1/16W
RG24	24998101	Res, Chip	100	D 1/16W
RG25	24998152	Res, Chip	1.5k	D 1/16W
RG26	24998472	Res, Chip	4.7k	D 1/16W
RG28	24998472	Res, Chip	4.7k	D 1/16W
RG29	24998302	Res, Chip	3k	D 1/16W
RG30	24998821	Res, Chip	820	D 1/16W
RG31	24998101	Res, Chip	100	D 1/16W
RG32	24998512	Res, Chip	5.1k	D 1/16W
RG33	24998222	Res, Chip	2.2k	D 1/16W
RG34	24998432	Res, Chip	4.3k	D 1/16W
RG35	24998103	Res, Chip	1k	D 1/16W
RG36	24998182	Res, Chip	1.8k	D 1/16W
RG37	24998822	Res, Chip	8.2k	D 1/16W
RG38	24998682	Res, Chip	6.8k	D 1/16W
RG39	24998222	Res, Chip	2.2k	D 1/16W
RG40	24998562	Res, Chip	5.6k	D 1/16W
RG41	24998392	Res, Chip	3.9k	D 1/16W
RG43	24998923	Res, Chip	92k	D 1/16W
RG44	24998274	Res, Chip	270k	D 1/16W
RG45	24998124	Res, Chip	120k	D 1/16W
RG46	24998473	Res, Chip	47k	D 1/16W
RG47	24998103	Res, Chip	1k	D 1/16W
RG48	24998220	Res, Chip	22	D 1/16W
RG60	24998822	Res, Chip	8.2k	D 1/16W
RG61	24998123	Res, Chip	12k	D 1/16W
RG62	24998393	Res, Chip	39k	D 1/16W
RG63	24998750	Res, Chip	75	D 1/16W
RG64	24998152	Res, Chip	1.5k	D 1/16W
RG65	24998102	Res, Chip	1k	D 1/16W
RG66	24998103	Res, Chip	1k	D 1/16W
RG67	24998103	Res, Chip	1k	D 1/16W
RG68	24998682	Res, Chip	6.8k	D 1/16W
RG70	24998102	Res, Chip	1k	D 1/16W
RG71	24998122	Res, Chip	1.2k	D 1/16W
RG72	24998332	Res, Chip	3.3k	D 1/16W
RG73	24998471	Res, Chip	470	D 1/16W
RG76	24998681	Res, Chip	680	D 1/16W
RR01	24998101	Res, Chip	100	D 1/16W
RR02	24998513	Res, Chip	51k	D 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RR04	24998751	Res, Chip	750	D 1/16W
RR06	24998182	Res, Chip	1.8k	D 1/16W
RR08	24998152	Res, Chip	1.5k	D 1/16W
RR12	24998212	Res, Chip	5.1k	D 1/16W
RR13	24998681	Res, Chip	680	D 1/16W
RR14	24998122	Res, Chip	1.2k	D 1/16W
RR15	24998512	Res, Chip	5.1k	D 1/16W
RR17	24998681	Res, Chip	680	D 1/16W
RR18	24998122	Res, Chip	1.2k	D 1/16W
RR19	24998153	Res, Chip	15k	D 1/16W
RR20	24998201	Res, Chip	200	D 1/16W
RR21	24998512	Res, Chip	5.1k	D 1/16W
RR23	24998222	Res, Chip	2.2k	D 1/16W
RR24	24998101	Res, Chip	100	D 1/16W
RR25	24998152	Res, Chip	1.5k	D 1/16W
RR26	24998472	Res, Chip	4.7k	D 1/16W
RR28	24998472	Res, Chip	4.7k	D 1/16W
RR29	24998302	Res, Chip	3k	D 1/16W
RR30	24998821	Res, Chip	820	D 1/16W
RR31	24998101	Res, Chip	100	D 1/16W
RR32	24998512	Res, Chip	5.1k	D 1/16W
RR33	24998222	Res, Chip	2.2k	D 1/16W
RR34	24998432	Res, Chip	4.3k	D 1/16W
RR35	24998103	Res, Chip	1k	D 1/16W
RR36	24998182	Res, Chip	1.8k	D 1/16W
RR37	24998822	Res, Chip	8.2k	D 1/16W
RR38	24998682	Res, Chip	6.8k	D 1/16W
RR39	24998222	Res, Chip	2.2k	D 1/16W
RR40	24998562	Res, Chip	5.6k	D 1/16W
RR41	24998392	Res, Chip	3.9k	D 1/16W
RR43	24998823	Res, Chip	82k	D 1/16W
RR44	24998274	Res, Chip	270k	D 1/16W
RR45	24998124	Res, Chip	120k	D 1/16W
RR46	24998473	Res, Chip	47k	D 1/16W
RR47	24998103	Res, Chip	1k	D 1/16W
RR48	24998220	Res, Chip	22	D 1/16W
RR60	24998822	Res, Chip	8.2k	D 1/16W
RR61	24998123	Res, Chip	12k	D 1/16W
RR62	24998393	Res, Chip	39k	D 1/16W
RR63	24998750	Res, Chip	75	D 1/16W
RR64	24998152	Res, Chip	1.5k	D 1/16W
RR65	24998102	Res, Chip	1k	D 1/16W
RR66	24998103	Res, Chip	1k	D 1/16W
RR67	24998103	Res, Chip	1k	D 1/16W
RR68	24998682	Res, Chip	6.8k	D 1/16W
RR70	24998102	Res, Chip	1k	D 1/16W
RR71	24998122	Res, Chip	1.2k	D 1/16W
RR72	24998332	Res, Chip	3.3k	D 1/16W
RR73	24998471	Res, Chip	470	D 1/16W
RR74	24998362	Res, Chip	3.6k	D 1/16W
RR76	24998681	Res, Chip	680	D 1/16W
RS01	24998472	Res, Chip	4.7k	D 1/16W
RS02	24998472	Res, Chip	4.7k	D 1/16W
RS06	24998302	Res, Chip	3k	D 1/16W
RS09	24998334	Res, Chip	330k	D 1/16W
RS10	24998471	Res, Chip	470	D 1/16W
RS11	24998101	Res, Chip	100	D 1/16W
RS12	24998513	Res, Chip	51k	D 1/16W
RS13	24998153	Res, Chip	15k	D 1/16W
RS15	24998102	Res, Chip	1k	D 1/16W
RS16	24998203	Res, Chip	20k	D 1/16W
RS17	24998103	Res, Chip	1k	D 1/16W
RS18	24998182	Res, Chip	1.8k	D 1/16W
RS19	24998751	Res, Chip	750	D 1/16W
RS20	24998682	Res, Chip	6.8k	D 1/16W
RS21	24998562	Res, Chip	5.6k	D 1/16W
RS22	24998153	Res, Chip	15k	D 1/16W
RS23	24998103	Res, Chip	1k	D 1/16W
RS24	24998912	Res, Chip	9.1k	D 1/16W
RS25	24998102	Res, Chip	1k	D 1/16W
RS28	24998303	Res, Chip	30k	D 1/16W
RS27	24998272	Res, Chip	2.7k	D 1/16W
RS28	24998392	Res, Chip	3.9k	D 1/16W
RS29	24998622	Res, Chip	6.2k	D 1/16W
RS30	24998272	Res, Chip	2.7k	D 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RS31	24998242	Res, Chip	2.4k	D 1/16W
RS32	24998332	Res, Chip	3.3k	D 1/16W
RS33	24998512	Res, Chip	5.1k	D 1/16W
RS35	24000568	Res, Block	68kX4	J 1/16W
RS36	24000568	Res, Block	68kX4	J 1/16W
RS43	24998683	Res, Chip	68k	D 1/16W
RS44	24998683	Res, Chip	68k	D 1/16W
RS45	24998272	Res, Chip	2.7k	D 1/16W
RS46	24998272	Res, Chip	2.7k	D 1/16W
RS47	24998102	Res, Chip	1k	D 1/16W
RS48	24000562	Res, Block	1kX4	J 1/16W
RS70	24998223	Res, Chip	22k	D 1/16W
		- MISCELLANEOUS -		
PR31	70184754	Connector, 20P		
PR32	70184754	Connector, 20P		
SA01	70145427	Slide Switch		
ZA01	70132449	Ceramic Rezonetor	10MHz	
ZS02	23303094	Filter, Chip, EMI	FILTEM1036	
ZS03	23303094	Filter, Chip, EMI	FILTEM1036	
■ UF01	70186592	P C Board Assy	FRONT(PB5976-1)	
		- DIODES -		
DF01	A8690640	Diode, LED	TLUG183	
DF02	70115496	Diode	RD6.2Z	
DF03	70115496	Diode	RD6.2Z	
DF04	70115496	Diode	RD6.2Z	
DF05	70115496	Diode	RD6.2Z	
DF06	70115496	Diode	RD6.2Z	
DF07	70115496	Diode	RD6.2Z	
DF08	70115496	Diode	RD6.2Z	
DF09	70115496	Diode	RD6.2Z	
DF10	70115496	Diode	RD6.2Z	
DF11	70115496	Diode	RD6.2Z	
		- COILS -		
LF01	23245859	Coil, Chip	15μH	
		- CAPACITORS -		
CF01	24086905	Cap, Chip, Tantalum	6.8μF	M 6.3V
CF02	24100104	Cap, Chip	0.1μF	Z 25V
CF03	24100104	Cap, Chip	0.1μF	Z 25V
CF04	24100104	Cap, Chip	0.1μF	Z 25V
CF05	24100104	Cap, Chip	0.1μF	Z 25V
CF06	24100104	Cap, Chip	0.1μF	Z 25V
CF07	24100104	Cap, Chip	0.1μF	Z 25V
CF08	24100104	Cap, Chip	0.1μF	Z 25V
CF09	24100104	Cap, Chip	0.1μF	Z 25V
CF10	24100104	Cap, Chip	0.1μF	Z 25V
CF11	24100104	Cap, Chip	0.1μF	Z 25V
		- RESISTORS -		
RF01	24998333	Res, Chip	33k	D 1/16W
RF02	24998203	Res, Chip	20k	D 1/16W
RF03	24998242	Res, Chip	2.4k	D 1/16W
RF04	24998182	Res, Chip	1.8k	D 1/16W
RF05	24998152	Res, Chip	1.5k	D 1/16W
RF06	24998102	Res, Chip	1k	D 1/16W
RF07	24998103	Res, Chip	1k	D 1/16W
RF08	70421338	Res, Variable	10k	0.3W
RF09	70421338	Res, Variable	10k	0.3W
RF10	70421338	Res, Variable	10k	0.3W
RF11	24998103	Res, Chip	1k	D 1/16W
RF12	24998103	Res, Chip	1k	D 1/16W
RF13	24998103	Res, Chip	1k	D 1/16W
RF14	24998182	Res, Chip	1.8k	D 1/16W
		- MISCELLANEOUS -		
PF03	70184751	Connector, 20P		
SF01	23145510	Push Switch	1C1P	
SF02	23145510	Push Switch	1C1P	
SF03	23145516	Push Switch	1C1P	
SF04	23145510	Push Switch	1C1P	
SF05	23145510	Push Switch	1C1P	
SF06	23145510	Push Switch	1C1P	
SF07	23145532	Slide Switch	2C3P	
SF08	23145532	Slide Switch	2C3P	
SF09	23145532	Slide Switch	2C3P	
SF10	23145539	Slide Switch	2C2P	

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
■ UP01	70186583	P C Board Assy	DC(PB5578-2)	
		- MISCELLANEOUS -		
PP02	23367465	Plug, 2P		
PP03	23368155	Plug, 10P		
■ UH01	70186722	P C Board Assy	DRIVER(PB6709-1)	
		- INTEGRATED CIRCUITS -		
QD01	80467626	IC	TC74HC4053AFS	
QD02	70200098	IC	AD813AR-14	
QD03	80467626	IC	TC74HC4053AFS	
QD04	70200098	IC	AD813AR-14	
QD05	A6030677	IC	TC7WU4FU	
QH01	A6030640	IC	TCTS32F	
QH02	A6030577	IC	TC7WU4FU	
QH03	70128296	IC	CXD1255Q	
QH04	80469617	IC	TC74VHC541FS	
QH05	80468821	IC	TC74AC04FS	
QH08	A6030787	IC	TCTSH86F	
QH07	80469621	IC	TC74VHC157FS	
QH08	A6030583	IC	TC7W08FU	
QH09	A6030150	IC	TC4S584F	
QH10	70200403	IC	XC1736D	
QH11	70200195	IC	XC3136A-5VQ6	
QH12	70129037	IC	UPD16502GS	
QH13	70200006	IC	NJM062V	
QH14	A6030683	IC	TC7W08FU	
QJ01	23319021	IC	LA7213	
QJ02	A6030877	IC	TC7W04FU	
QJ03	80467626	IC	TC74HC4053AFS	
QJ04	A6030787	IC	TCTSH86F	
QJ05	80469527	IC	TC74VHC164FS	
QJ06	70200181	IC	M66344FFV-G	
QJ07	70200184	IC	CXD1247N	
QJ08	80467626	IC	TC74HC4053AFS	
QJ09	70200906	IC	NJM052V	
QJ10	70129166	IC	CXD1217Q	
QJ11	80467532	IC	TC74HC4538AFS	
QJ12	80469507	IC	TC74VHC86FS	
QJ13	70128971	IC	SN74LS123NS	
QJ14	70200006	IC	NJM052V	
QL01	70200006	IC	AD813AR-14	
QL02	A6030630	IC	TCTS08F	
QL03	70200006	IC	AD813AR-14	
QL04	80467526	IC	TC74HC4053AFS	
QL05	70200145	IC	BA7655AF	
QL06	70200193	IC	M51272FP	
QL07	70200145	IC	BA7655AF	
QL08	70200179	IC	AD8011AR	
QT01	70128283	IC	NJM2136M	
QT02	A6030150	IC	TC4S584F	
QT03	70200182	IC	LM2575M-ADJ	
QX01	70200179	IC	AD8011AR	
QX02	70129349	IC	CXA1439M	
QX03	70200179	IC	AD8011AR	
QY01	70200179	IC	AD8011AR	
QY02	70129349	IC	CXA1439M	
QY03	70200179	IC	AD8011AR	
QZ01	70200179	IC	AD8011AR	
QZ02	70129349	IC	CXA1439M	
QZ03	70200179	IC	AD8011AR	
		- TRANSISTORS -		
QD10	23314558	Transistor, Chip	2SA1610	
QH50	A6545570	Transistor, Chip	2SA1586-Y	
QH31	70114340	Transistor, Chip	UPA674T	
QH32	A6545570	Transistor, Chip	2SA1586-Y	
QH33	A6365620	Transistor, Chip	2SC4116-Y	
QH34	70114340	Transistor, Chip	UPA674T	
QJ26	A6365620	Transistor, Chip	2SC4116-Y	
QJ21	23314570	Transistor, Chip	UN5116	
QJ22	23314558	Transistor, Chip	2SA1610	
QJ23	23314558	Transistor, Chip	2SA1610	
QJ24	23314684	Transistor, Chip	XN5531	
QJ25	70114329	Transistor, Chip	UPA673T	
QJ26	23314507	Transistor, Chip	2SC3931-C	
QJ27	A6043330	Transistor, Chip	2SK209-Y	

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
QT10	23314270	Transistor, Chip	UN5212
		- DIODES -	
DH01	23118041	Diode, Chip	MA111
DH02	23118041	Diode, Chip	MA111
DH04	23118041	Diode, Chip	MA111
DH05	23118041	Diode, Chip	MA111
DJ01	AT154100	Diode, Chip	1SS302
DJ04	23316781	Diode, Chip	1T369-T8A
DJ05	23118041	Diode, Chip	MA111
DT01	23118041	Diode, Chip	MA111
DT02	23316244	Diode	5Z5B-54V
DT03	23118041	Diode, Chip	MA111
		- COILS -	
LH01	23245847	Coil, Chip	33 uH
LH02	23245847	Coil, Chip	33 uH
LH04	23245801	Coil, Chip	150 uH
LJ03	23245842	Coil, Chip	100 uH
LJ04	23245847	Coil, Chip	33 uH
LL01	23245846	Chip, coil	220 uH
LL02	23245846	Chip, coil	220 uH
LT01	70211090	Coil, Choke	33 uH
LT02	70211090	Coil, Choke	33 uH
		- CAPACITORS -	
CD01	24086975	Cap, Chip, Tantalum	68 uF M 6.3V
CD02	24086973	Cap, Chip, Tantalum	15 uF M 6.3V
CD03	24086905	Cap, Chip, Tantalum	6.8 uF M 6.3V
CD04	24815479	Cap, Chip, Ceramic	0.047 uF K 50V
CH01	24086973	Cap, Chip, Tantalum	15 uF M 6.3V
CH02	24109103	Cap, Chip, Ceramic	0.01 uF K 25V
CH03	24109103	Cap, Chip, Ceramic	0.01 uF K 25V
CH04	24109104	Cap, Chip	0.1 uF Z 25V
CH05	24109104	Cap, Chip	0.1 uF Z 25V
CH06	24086973	Cap, Chip, Tantalum	15 uF M 6.3V
CH07	24105270	Cap, Chip, Ceramic	27pF J 50V
CH08	24086905	Cap, Chip, Tantalum	6.8 uF M 6.3V
CH09	24256105	Cap, Chip, Tantalum	1 uF M 35V
CH10	24086906	Cap, Chip, Tantalum	4.7 uF M 10V
CH11	24109103	Cap, Chip, Ceramic	0.01 uF K 25V
CH12	24109102	Cap, Chip, Ceramic	1000pF K 50V
CH13	24109102	Cap, Chip, Ceramic	1000pF K 50V
CH14	24086974	Cap, Chip, Tantalum	33 uF M 6.3V
CH15	24086952	Cap, Chip, Tantalum	15 uF M 16V
CH16	24086904	Cap, Chip, Tantalum	2.2 uF M 35V
CH17	24086977	Cap, Chip, Tantalum	100 uF M 20V
CH18	24086905	Cap, Chip, Tantalum	6.8 uF M 6.3V
CH19	24109103	Cap, Chip, Ceramic	0.01 uF K 25V
CJ01	24086979	Cap, Chip, Tantalum	1 uF M 25V
CJ02	24109581	Cap, Chip, Ceramic	680pF K 50V
CJ05	24109222	Cap, Chip, Ceramic	2200pF K 50V
CJ04	24086906	Cap, Chip, Tantalum	4.7 uF M 10V
CJ05	24086906	Cap, Chip, Tantalum	4.7 uF M 10V
CJ06	24105471	Cap, Chip, Ceramic	470pF K 50V
CJ07	24086905	Cap, Chip, Tantalum	6.8 uF M 6.3V
CJ08	24105180	Cap, Chip, Ceramic	18pF J 50V
CJ09	24109104	Cap, Chip	0.1 uF Z 25V
CJ10	24086974	Cap, Chip, Tantalum	33 uF M 6.3V
CJ11	24086906	Cap, Chip, Tantalum	4.7 uF M 10V
CJ12	24086979	Cap, Chip, Tantalum	1 uF M 25V
CJ13	24109103	Cap, Chip, Ceramic	0.01 uF K 25V
CJ14	24109104	Cap, Chip	0.1 uF Z 25V
CJ15	24086906	Cap, Chip, Tantalum	4.7 uF M 10V
CJ16	24086906	Cap, Chip, Tantalum	4.7 uF M 10V
CJ17	24086905	Cap, Chip, Tantalum	6.8 uF M 6.3V
CJ18	24086905	Cap, Chip, Tantalum	6.8 uF M 6.3V
CJ19	24109102	Cap, Chip, Ceramic	1000pF K 50V
CJ20	24105470	Cap, Chip, Ceramic	47pF J 50V
CJ21	24109561	Cap, Chip, Ceramic	560pF K 50V
CJ22	24092441	Cap, Chip, Ceramic	1 uF Z 16V
CJ23	24815333	Cap, Chip	0.03 uF K 50V
CJ24	24086973	Cap, Chip, Tantalum	15 uF M 6.3V
CJ25	24086951	Cap, Chip, Tantalum	6.8 uF M 16V
CJ26	24105180	Cap, Chip, Ceramic	18pF J 50V
CJ27	24109104	Cap, Chip	0.1 uF Z 25V
CJ28	24092778	Cap, Chip, Ceramic	0.1 uF K 25V
CJ29	24086946	Cap, Chip, Tantalum	10 uF M 10V

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
CJ30	24105479	Cap, Chip, Ceramic	47pF J 50V
CJ31	24109104	Cap, Chip	0.1 uF Z 25V
CJ32	24092178	Cap, Chip, Ceramic	0.1 uF K 25V
CJ33	24086946	Cap, Chip, Tantalum	10 uF M 10V
CJ35	24109104	Cap, Chip	0.1 uF Z 25V
CJ36	24105560	Cap, Chip, Ceramic	56pF J 50V
CJ37	24086905	Cap, Chip, Tantalum	6.8 uF M 6.3V
CJ38	24105560	Cap, Chip, Ceramic	56pF J 50V
CJ39	24109681	Cap, Chip, Ceramic	680pF K 50V
CJ40	24109104	Cap, Chip	0.1 uF Z 25V
CL01	24105150	Cap, Chip, Ceramic	15pF J 50V
CL02	24105150	Cap, Chip, Ceramic	15pF J 50V
CL03	24086974	Cap, Chip, Tantalum	33 uF M 6.3V
CL04	24086973	Cap, Chip, Tantalum	15 uF M 6.3V
CL05	24086966	Cap, Chip, Tantalum	10 uF M 4V
CL06	24086966	Cap, Chip, Tantalum	10 uF M 4V
CL07	24105390	Cap, Chip, Ceramic	39pF J 50V
CL08	24105390	Cap, Chip, Ceramic	39pF J 50V
CL09	24105389	Cap, Chip, Ceramic	39pF J 50V
CL10	24105390	Cap, Chip, Ceramic	39pF J 50V
CL11	24086905	Cap, Chip, Tantalum	6.8 uF M 6.3V
CL12	24086905	Cap, Chip, Tantalum	6.8 uF M 6.3V
CL13	24086905	Cap, Chip, Tantalum	6.8 uF M 6.3V
CL14	24086966	Cap, Chip, Tantalum	10 uF M 4V
CL15	24086966	Cap, Chip, Tantalum	10 uF M 4V
CL16	24285474	Cap, Chip, Tantalum	0.47 uF M 25V
CL17	24086905	Cap, Chip, Tantalum	6.8 uF M 6.3V
CL18	24109103	Cap, Chip, Ceramic	0.01 uF K 25V
CL19	24295474	Cap, Chip, Tantalum	0.47 uF M 25V
CL20	24086905	Cap, Chip, Tantalum	6.8 uF M 6.3V
CL21	24109103	Cap, Chip, Ceramic	0.01 uF K 25V
CL22	24086973	Cap, Chip, Tantalum	15 uF M 6.3V
CL23	24086966	Cap, Chip, Tantalum	10 uF M 4V
CL24	24109104	Cap, Chip	0.1 uF Z 25V
CL25	24109104	Cap, Chip	0.1 uF Z 25V
CL26	24109104	Cap, Chip	0.1 uF Z 25V
CL27	24109104	Cap, Chip	0.1 uF Z 25V
CL28	24109104	Cap, Chip	0.1 uF Z 25V
CL29	24109104	Cap, Chip	0.1 uF Z 25V
CL30	24086966	Cap, Chip, Tantalum	10 uF M 4V
CL31	24092178	Cap, Chip, Ceramic	0.1 uF K 25V
CT01	24086906	Cap, Chip, Tantalum	4.7 uF M 10V
CT02	24086905	Cap, Chip, Tantalum	6.8 uF M 10V
CT03	24815105	Chip, Electrolytic	1 uF M 25V
CT04	24819095	Chip, Electrolytic	220 uF M 4V
CT05	24086975	Cap, Chip, Tantalum	68 uF M 6.3V
CT06	24086975	Cap, Chip, Tantalum	68 uF M 6.3V
CX01	24819098	Chip, Chemicon	100 uF M 6.3V
CX02	24105479	Cap, Chip, Ceramic	47pF J 50V
CX03	24092179	Cap, Chip, Ceramic	0.22 uF K 25V
CX04	24086975	Cap, Chip, Tantalum	68 uF M 6.3V
CX05	24086966	Cap, Chip, Tantalum	10 uF M 4V
CX06	24105430	Cap, Chip, Ceramic	43Ø J 50V
CX07	24086973	Cap, Chip, Tantalum	15 uF M 6.3V
CX08	24086973	Cap, Chip, Tantalum	15 uF M 6.3V
CX09	24086975	Cap, Chip, Tantalum	68 uF M 6.3V
CX10	24092178	Cap, Chip, Ceramic	0.1 uF K 25V
CX11	24092178	Cap, Chip, Ceramic	0.1 uF K 25V
CY01	24819098	Chip, Chemicon	100 uF M 6.3V
CY02	24105479	Cap, Chip, Ceramic	47pF J 50V
CY03	24092179	Cap, Chip, Ceramic	0.22 uF K 25V
CY04	24086975	Cap, Chip, Tantalum	68 uF M 6.3V
CY05	24086966	Cap, Chip, Tantalum	10 uF M 4V
CY06	24105430	Cap, Chip, Ceramic	430 J 50V
CY09	24086975	Cap, Chip, Tantalum	68 uF M 6.3V
CZ01	24819098	Chip, Chemicon	100 uF M 6.3V
CZ02	24105479	Cap, Chip, Ceramic	47pF J 50V
CZ03	24092179	Cap, Chip, Ceramic	0.22 uF K 25V
CZ04	24086975	Cap, Chip, Tantalum	68 uF M 6.3V
CZ05	24086966	Cap, Chip, Tantalum	10 uF M 4V
CZ06	24105430	Cap, Chip, Ceramic	430 J 50V
CZ09	24086975	Cap, Chip, Tantalum	68 uF M 6.3V
		- RESISTORS -	
RD01	24998751	Res, Chip	750 D 1/16W
RD02	24998133	Res, Chip	13k D 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RD03	24998822	Res, Chip	8.2k	D 1/16W
RD04	24998272	Res, Chip	2.7k	D 1/16W
RD05	24998751	Res, Chip	750	D 1/16W
RD06	24998751	Res, Chip	750	D 1/16W
RD07	24998750	Res, Chip	75	D 1/16W
RD08	24998750	Res, Chip	75	D 1/16W
RD09	24998750	Res, Chip	75	D 1/16W
RD10	24998751	Res, Chip	750	D 1/16W
RD11	24998751	Res, Chip	750	D 1/16W
RD12	24998242	Res, Chip	2.4k	D 1/16W
RD13	24998822	Res, Chip	8.2k	D 1/16W
RD14	24998751	Res, Chip	750	D 1/16W
RD15	24998750	Res, Chip	75	D 1/16W
RD16	24998750	Res, Chip	75	D 1/16W
RD17	24998750	Res, Chip	75	D 1/16W
RD18	24998750	Res, Chip	75	D 1/16W
RD19	24998750	Res, Chip	75	D 1/16W
RD20	24998750	Res, Chip	75	D 1/16W
RD21	24998301	Res, Chip	300	D 1/16W
RD22	24998301	Res, Chip	300	D 1/16W
RD23	24998471	Res, Chip	470	D 1/16W
RH01	24998202	Res, Chip	2k	D 1/16W
RH02	24011105	Res, Chip	1M	J 1/20W
RH03	24011105	Res, Chip	1M	J 1/20W
RH04	24000445	Res, Chip Jumper	0	
RH05	24998102	Res, Chip	1k	D 1/16W
RH06	24998473	Res, Chip	47k	D 1/16W
RH10	24998102	Res, Chip	1k	D 1/16W
RH11	24998102	Res, Chip	1k	D 1/16W
RH12	24998153	Res, Chip	15k	D 1/16W
RH13	24998103	Res, Chip	1k	D 1/16W
RH14	24998203	Res, Chip	20k	D 1/16W
RH15	24998203	Res, Chip	20k	D 1/16W
RH16	24998222	Res, Chip	2.2k	D 1/16W
RH17	24998103	Res, Chip	1k	D 1/16W
RH18	24998103	Res, Chip	1k	D 1/16W
RH19	24998101	Res, Chip	100	D 1/16W
RH20	24000445	Res, Chip Jumper	0	
RH21	24998103	Res, Chip	1k	D 1/16W
RH26	24998220	Res, Chip	22	D 1/16W
RH27	24998220	Res, Chip	22	D 1/16W
RH28	24998472	Res, Chip	4.7k	D 1/16W
RH29	24998472	Res, Chip	4.7k	D 1/16W
RH30	24998822	Res, Chip	8.2k	D 1/16W
RH31	24998103	Res, Chip	1k	D 1/16W
RH32	24998272	Res, Chip	2.7k	D 1/16W
RH33	24998152	Res, Chip	1.5k	D 1/16W
RH34	24998332	Res, Chip	3.3k	D 1/16W
RH35	24998133	Res, Chip	13k	D 1/16W
RH36	24998622	Res, Chip	6.2k	D 1/16W
RH37	24998223	Res, Chip	22k	D 1/16W
RH38	24998333	Res, Chip	33k	D 1/16W
RH39	24998511	Res, Chip	510	D 1/16W
RH40	24998511	Res, Chip	510	D 1/16W
RH41	24998511	Res, Chip	510	D 1/16W
RH42	24998511	Res, Chip	510	D 1/16W
RH46	24998511	Res, Chip	510	D 1/16W
RH50	24998511	Res, Chip	510	D 1/16W
RH80	24998221	Res, Chip	220	D 1/16W
RH81	24998221	Res, Chip	220	D 1/16W
RJ01	24998392	Res, Chip	3.9k	D 1/16W
RJ02	24998392	Res, Chip	3.9k	D 1/16W
RJ03	24998563	Res, Chip	56k	D 1/16W
RJ04	24998334	Res, Chip	330k	D 1/16W
RJ05	24998103	Res, Chip	1k	D 1/16W
RJ06	24998104	Res, Chip	100k	D 1/16W
RJ07	24998472	Res, Chip	4.7k	D 1/16W
RJ08	24998103	Res, Chip	1k	D 1/16W
RJ09	24998104	Res, Chip	100k	D 1/16W
RJ10	24998472	Res, Chip	4.7k	D 1/16W
RJ11	24998103	Res, Chip	1k	D 1/16W
RJ12	24998562	Res, Chip	5.6k	D 1/16W
RJ13	24998123	Res, Chip	12k	D 1/16W
RJ14	24998152	Res, Chip	1.5k	D 1/16W
RJ15	24998471	Res, Chip	470	D 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RJ16	24998332	Res, Chip	3.3k	D 1/16W
RJ17	24998152	Res, Chip	1.5k	D 1/16W
RJ18	24998753	Res, Chip	75k	D 1/16W
RJ19	24998272	Res, Chip	2.7k	D 1/16W
RJ20	24998152	Res, Chip	1.5k	D 1/16W
RJ21	24998272	Res, Chip	2.7k	D 1/16W
RJ22	24998562	Res, Chip	5.6k	D 1/16W
RJ24	24000445	Res, Chip Jumper	0	
RJ25	24998153	Res, Chip	15k	D 1/16W
RJ26	24998393	Res, Chip	33k	D 1/16W
RJ27	24998333	Res, Chip	33k	D 1/16W
RJ29	24000445	Res, Chip Jumper	0	
RJ30	24998102	Res, Chip	1k	D 1/16W
RJ31	24998103	Res, Chip	1k	D 1/16W
RJ32	24998472	Res, Chip	4.7k	D 1/16W
RJ33	24998102	Res, Chip	1k	D 1/16W
RJ34	24998562	Res, Chip	5.6k	D 1/16W
RJ35	24998332	Res, Chip	3.3k	D 1/16W
RJ36	24998153	Res, Chip	15k	D 1/16W
RJ37	24998222	Res, Chip	2.2k	D 1/16W
RJ38	24998223	Res, Chip	22k	D 1/16W
RJ39	24998103	Res, Chip	1k	D 1/16W
RJ40	24000445	Res, Chip Jumper	0	
RJ43	24000445	Res, Chip Jumper	0	
RJ44	24998222	Res, Chip	2.2k	D 1/16W
RJ45	24011105	Res, Chip	1M	J 1/20W
RJ46	24000445	Res, Chip Jumper	0	
RJ48	24998333	Res, Chip	33k	D 1/16W
RJ49	24011104	Res, Chip	100k	J 1/20W
RJ50	24998302	Res, Chip	3k	D 1/16W
RJ51	24998243	Res, Chip	24k	D 1/16W
RJ52	24998123	Res, Chip	12k	D 1/16W
RJ53	24998102	Res, Chip	1k	D 1/16W
RJ54	24998103	Res, Chip	1k	D 1/16W
RJ55	24998183	Res, Chip	18k	D 1/16W
RJ56	24998822	Res, Chip	8.2k	D 1/16W
RJ57	24998623	Res, Chip	62k	D 1/16W
RJ58	24998753	Res, Chip	7.5k	D 1/16W
RJ59	24998222	Res, Chip	2.2k	D 1/16W
RJ70	24998101	Res, Chip	100	D 1/16W
RJ71	24998102	Res, Chip	1k	D 1/16W
RJ72	24998102	Res, Chip	1k	D 1/16W
RJ73	24998103	Res, Chip	1k	D 1/16W
RJ74	24998243	Res, Chip	24k	D 1/16W
RJ75	24998183	Res, Chip	18k	D 1/16W
RJ76	24998222	Res, Chip	2.2k	D 1/16W
RJ77	24998101	Res, Chip	100	D 1/16W
RJ78	24998103	Res, Chip	1k	D 1/16W
RJ81	24000445	Res, Chip Jumper	0	
RJ82	24998332	Res, Chip	3.3k	D 1/16W
RJ83	24998152	Res, Chip	1.5k	D 1/16W
RJ84	24998102	Res, Chip	1k	D 1/16W
RJ85	24998332	Res, Chip	3.3k	D 1/16W
RJ86	24998152	Res, Chip	1.5k	D 1/16W
RJ87	24998102	Res, Chip	1k	D 1/16W
RJ88	24998104	Res, Chip	100k	D 1/16W
RJ89	24998563	Res, Chip	56k	D 1/16W
RJ90	24998102	Res, Chip	1k	D 1/16W
RJ91	24998102	Res, Chip	1k	D 1/16W
RJ92	24998752	Res, Chip	7.5k	D 1/16W
RJ93	24998101	Res, Chip	100	D 1/16W
RJ96	24000445	Res, Chip Jumper	0	
RJ97	24011105	Res, Chip	1M	J 1/20W
RJ98	24998470	Res, Chip	47	D 1/16W
RJ99	24998470	Res, Chip	47	D 1/16W
RL01	24998912	Res, Chip	9.1k	D 1/16W
RL02	24998821	Res, Chip	820	D 1/16W
RL03	24998182	Res, Chip	1.8k	D 1/16W
RL04	24998159	Res, Chip	15	D 1/16W
RL05	24998152	Res, Chip	1.5k	D 1/16W
RL06	24998300	Res, Chip	30	D 1/16W
RL07	24998102	Res, Chip	1k	D 1/16W
RL08	24998102	Res, Chip	1k	D 1/16W
RL09	24998432	Res, Chip	4.3k	D 1/16W
RL10	24998241	Res, Chip	240	D 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RL11	24998222	Res, Chip	2.2k	D 1/16W
RL12	24998181	Res, Chip	100	D 1/16W
RL13	24998152	Res, Chip	1.5k	D 1/16W
RL14	24998270	Res, Chip	27	D 1/16W
RL15	24998102	Res, Chip	1k	D 1/16W
RL16	24998102	Res, Chip	1k	D 1/16W
RL17	24998292	Res, Chip	2k	D 1/16W
RL18	24998202	Res, Chip	2k	D 1/16W
RL19	24998202	Res, Chip	2k	D 1/16W
RL20	24998330	Res, Chip	33	D 1/16W
RL21	24998103	Res, Chip	1k	D 1/16W
RL22	24998911	Res, Chip	910	D 1/16W
RL23	24998122	Res, Chip	1.2k	D 1/16W
RL25	24998512	Res, Chip	5.1k	D 1/16W
RL26	24998471	Res, Chip	470	D 1/16W
RL27	24998122	Res, Chip	1.2k	D 1/16W
RL28	24998122	Res, Chip	1.2k	D 1/16W
RL30	24998100	Res, Chip	10	D 1/16W
RL31	24998750	Res, Chip	75	D 1/16W
RL32	24998152	Res, Chip	1.5k	D 1/16W
RL33	24998152	Res, Chip	1.5k	D 1/16W
RL34	24998221	Res, Chip	220	D 1/16W
RL35	24998222	Res, Chip	2.2k	D 1/16W
RL36	24998122	Res, Chip	1.2k	D 1/16W
RL37	24998102	Res, Chip	1k	D 1/16W
RL38	24998201	Res, Chip	200	D 1/16W
RL39	24998222	Res, Chip	2.2k	D 1/16W
RL40	24998122	Res, Chip	1.2k	D 1/16W
RL41	24998102	Res, Chip	1k	D 1/16W
RL42	24998201	Res, Chip	200	D 1/16W
RL43	24998153	Res, Chip	15k	D 1/16W
RL44	24998203	Res, Chip	20k	D 1/16W
RL45	24998153	Res, Chip	15k	D 1/16W
RL46	24998273	Res, Chip	27k	D 1/16W
RL47	24998472	Res, Chip	4.7k	D 1/16W
RL48	24998433	Res, Chip	43k	D 1/16W
RL49	24998432	Res, Chip	4.3k	D 1/16W
RL50	24998102	Res, Chip	1k	D 1/16W
RL51	24998201	Res, Chip	200	D 1/16W
RL52	24998821	Res, Chip	820	D 1/16W
RL53	24998102	Res, Chip	1k	D 1/16W
RL54	24998391	Res, Chip	390	D 1/16W
RL55	24998821	Res, Chip	820	D 1/16W
RL56	24998103	Res, Chip	1k	D 1/16W
RL57	24998272	Res, Chip	2.7k	D 1/16W
RL58	24998561	Res, Chip	560	D 1/16W
RL59	24998303	Res, Chip	30k	D 1/16W
RL70	24998561	Res, Chip	560	D 1/16W
RL71	24998473	Res, Chip	47k	D 1/16W
RL72	24998392	Res, Chip	3.9k	D 1/16W
RL73	24998502	Res, Chip	5k	D 1/16W
RL74	24998102	Res, Chip	1k	D 1/16W
RL75	24998102	Res, Chip	1k	D 1/16W
RL76	24998821	Res, Chip	820	D 1/16W
RL77	24998102	Res, Chip	1k	D 1/16W
RL78	24998151	Res, Chip	150	D 1/16W
RL80	24998202	Res, Chip	2k	D 1/16W
RT01	24998822	Res, Chip	8.2k	D 1/16W
RT02	24998222	Res, Chip	2.2k	D 1/16W
RT03	24998104	Res, Chip	100k	D 1/16W
RT04	24998202	Res, Chip	2k	D 1/16W
RT05	24998512	Res, Chip	5.1k	D 1/16W
RT06	24998823	Res, Chip	82k	D 1/16W
RT07	24998223	Res, Chip	22k	D 1/16W
RT08	24998221	Res, Chip	220	D 1/16W
RT09	24998302	Res, Chip	3k	D 1/16W
RT10	24998202	Res, Chip	2k	D 1/16W
RX01	24998510	Res, Chip	51	D 1/16W
RX02	24998821	Res, Chip	820	D 1/16W
RX03	24998102	Res, Chip	1k	D 1/16W
RX04	24998181	Res, Chip	100	D 1/16W
RX05	24998180	Res, Chip	18	D 1/16W
RX06	24998471	Res, Chip	470	D 1/16W
RX07	24998471	Res, Chip	470	D 1/16W
RX08	24998622	Res, Chip	6.2k	D 1/16W

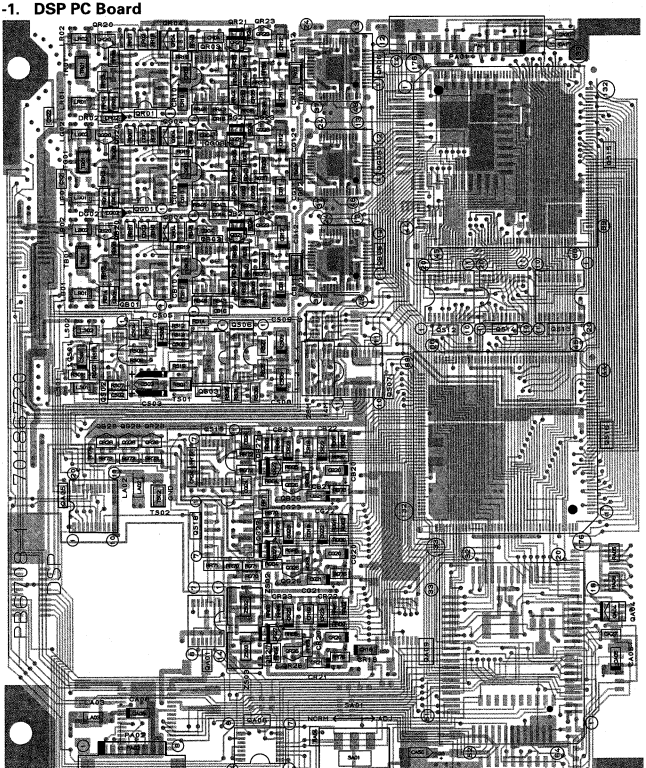
LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RX09	24998202	Res, Chip	2k	D 1/16W
RX10	24998202	Res, Chip	2k	D 1/16W
RX11	24998201	Res, Chip	200	D 1/16W
RY01	24998510	Res, Chip	51	D 1/16W
RY02	24998102	Res, Chip	1k	D 1/16W
RY03	24998102	Res, Chip	1k	D 1/16W
RY04	24998101	Res, Chip	100	D 1/16W
RY05	24998180	Res, Chip	18	D 1/16W
RY06	24998471	Res, Chip	470	D 1/16W
RY07	24998471	Res, Chip	470	D 1/16W
RY08	24998622	Res, Chip	6.2k	D 1/16W
RY09	24998202	Res, Chip	2k	D 1/16W
RY10	24998222	Res, Chip	2.2k	D 1/16W
RY11	24998201	Res, Chip	200	D 1/16W
RZ01	24998510	Res, Chip	51	D 1/5W
RZ02	24998621	Res, Chip	620	D 1/5W
RZ03	24998102	Res, Chip	1k	D 1/16W
RZ04	24998101	Res, Chip	100	D 1/16W
RZ05	24998180	Res, Chip	18	D 1/16W
RZ06	24998471	Res, Chip	470	D 1/5W
RZ07	24998471	Res, Chip	470	D 1/16W
RZ08	24998622	Res, Chip	6.2k	D 1/16W
RZ09	24998202	Res, Chip	2k	D 1/16W
RZ10	24998202	Res, Chip	2k	D 1/16W
RZ11	24998201	Res, Chip	200	D 1/16W
		- MISCELLANEOUS -		
PH01	70184755	Connector, 20P		
PH02	70184755	Connector, 20P		
PH04	70184750	Connector, 20P		
PH05	70184750	Connector, 20P		
ZH01	70132466	VCXO	28.375MHz	
ZH02	23303094	Filter, Chip, EMI	FILTEM1036	
ZJ01	70132384	Filter		
ZJ01A	70852574	Insulator Shield Sheet		
ZJ02	70132514	T629LKN-1556 DL SC		
ZJ03	70132515	DL SC VAR	T629LKN-1555	
ZJ04	23303064	Filter, Chip, EMI	FILTEM1038	
ZJ05	23303094	Filter, Chip, EMI	FILTEM1036	
ZJ06	23303091	EMI Filter, Chip	FILTEM1033	
ZL01	70132504	Ferrite	T630EMN-1474	
ZL02	70132504	Ferrite	T630EMN-1474	
ZL03	70132434	BPF	9.58MHz	
ZL04	23303094	Filter, Chip, EMI	FILTEM1036	
ZL05	23303064	Filter, Chip, EMI	FILTEM1038	
ZT01	70131232	Ferrite, Chip	HF50ACC5750T	
ZX01	70132512	EQ Pre-Amp	T629EKN-1553	
ZX02	70132513	LPF Pre-Amp	T629LKN-1554	
ZX03	23303094	Filter, Chip, EMI	FILTEM1036	
ZX04	23303064	Filter, Chip, EMI	FILTEM1038	
ZY01	70132512	EQ Pre-Amp	T629EKN-1553	
ZY02	70132513	LPF Pre-Amp	T629LKN-1554	
ZZ01	70132512	EQ Pre-Amp	T629EKN-1553	
ZZ02	70132513	LPF Pre-Amp	T629LKN-1554	

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
		- MECHANICAL PARTS -	
A001S	70381081	Camera Head Ass'y	
A110	70884382	Case, Cam. Head	
A110A	70391886	Screw	2x2.2mm
A111	70817230	Back Cover, Cam. Head	
A111A	70391436	Screw	2x0.4x5mm
A113	70869181	Cap, C Mount	
A201	70884380	Front Panel, CCU	
A201K	70391436	Screw	2x0.4x5mm
A202	70814456	Case, CCU	
A202A	70391436	Screw	2x0.4x5mm
A203	70815788	Bottom Cover, CCU	
A203A	70869154	Foot Rubber	
A204	70817228	Rear Panel, CCU	
A204A	70391436	Screw	2x0.4x5mm
A210A	70391436	Screw	2x0.4x5mm
AT01	70917611	Carton	
AT01A	70975398	Label, Carton	
AT02	70921425	Packing (U)	
AT03	70921424	Packing (B)	
AT10	70933137	Cover	
H001	70137289	DC-DC Converter	
H001B	70391436	Screw	2x0.4x5mm
PC04	70165208	Connector, DC Input	HR10-7R-4PB
PC05	70165277	Connector, BNC	
PC06	70165249	Connector, Y/C	TCS7848
PC07	70164760	Connector, 9S D-SUB	
PC07A	70391889	Stud	#4-40UNC-M3
PC08	70165275	Connector	HR10A-10R-12P1
PC09	70165277	Connector, BNC	
PC10	70164759	Connector, 9P D-SUB	
PC10A	70391889	Stud	#4-40UNC-M3
PF01	70164764	Connector, 20P	
PX62	70164764	Connector, 20P	
UF01A	70391436	Screw	2x0.4x5mm
UG01A	70391436	Screw	2x0.4x5mm
UH01A	70391890	Screw	M2-L7
W002	70175661	FFC	20P
W003	70175662	FFC	20P
W003A	70103036	Ferrite Core	SSC33.5-12-F
W005B	70869084	Spacer	
Y110	70971658	Instruction Manual	
Y110A	70933080	Cover	

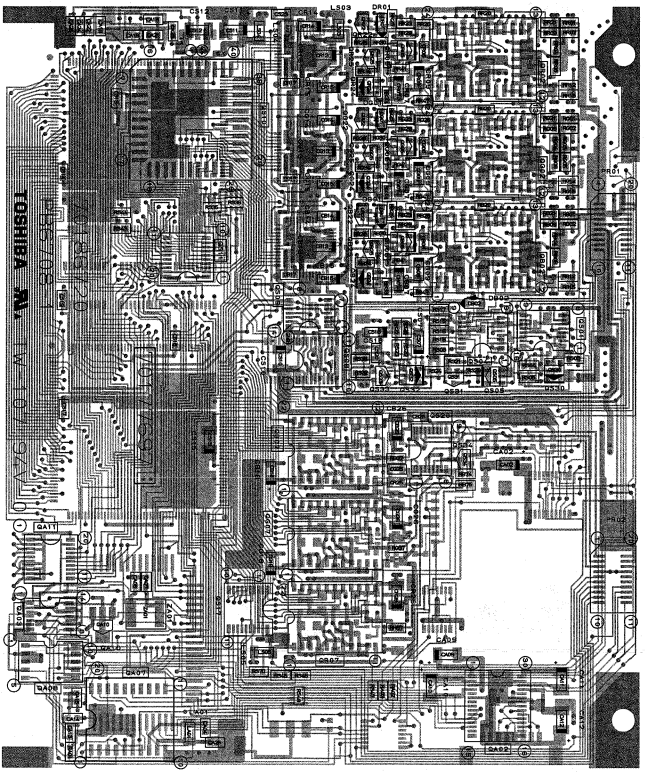
SECTION 4
PC BOARDS AND SCHEMATIC DIAGRAMS

1. PC BOARDS

1-1. DSP PC Board

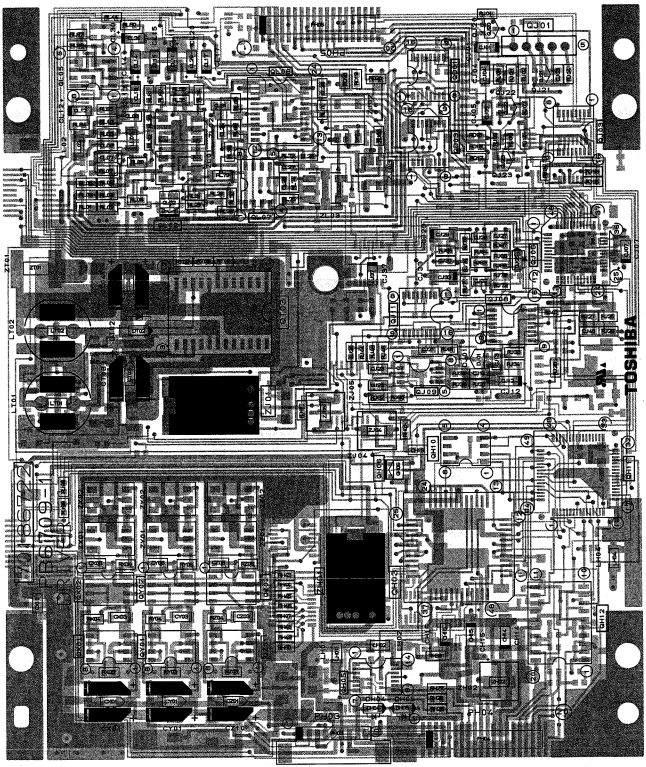


Component Side

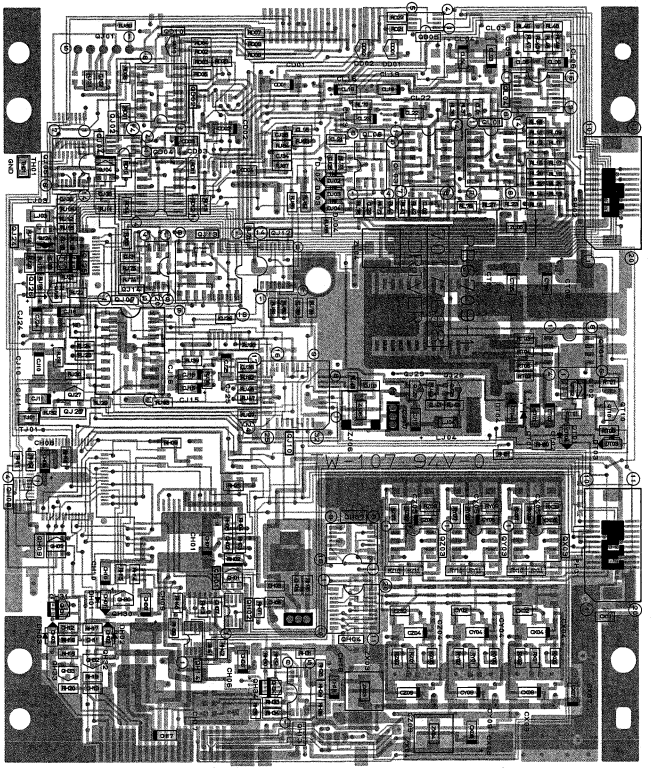


Soldering Side

1-2. Driver PC Board

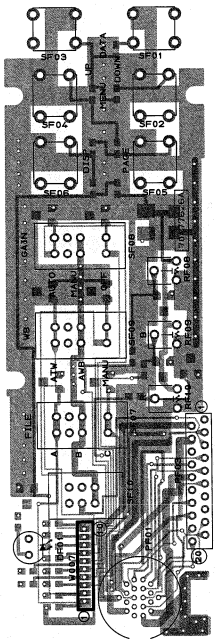


Component Side

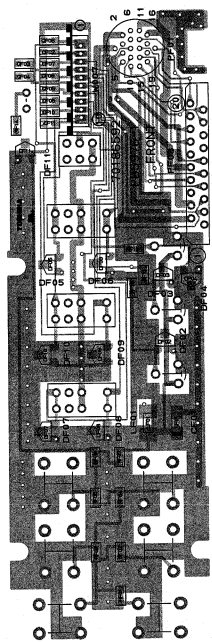


Soldering Side

1-3. Front PC Board

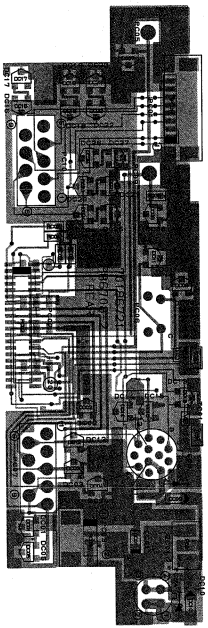


Component Side

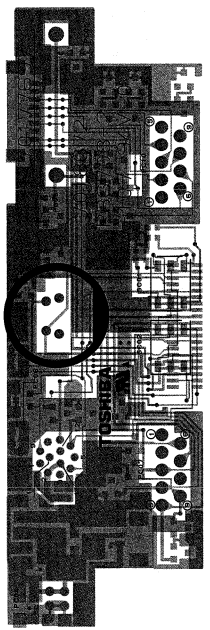


Soldering Side

1-4. Rear PC Board

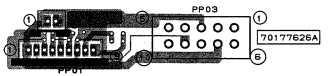


Component Side

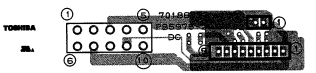


Soldering Side

1-5. DC PC Board



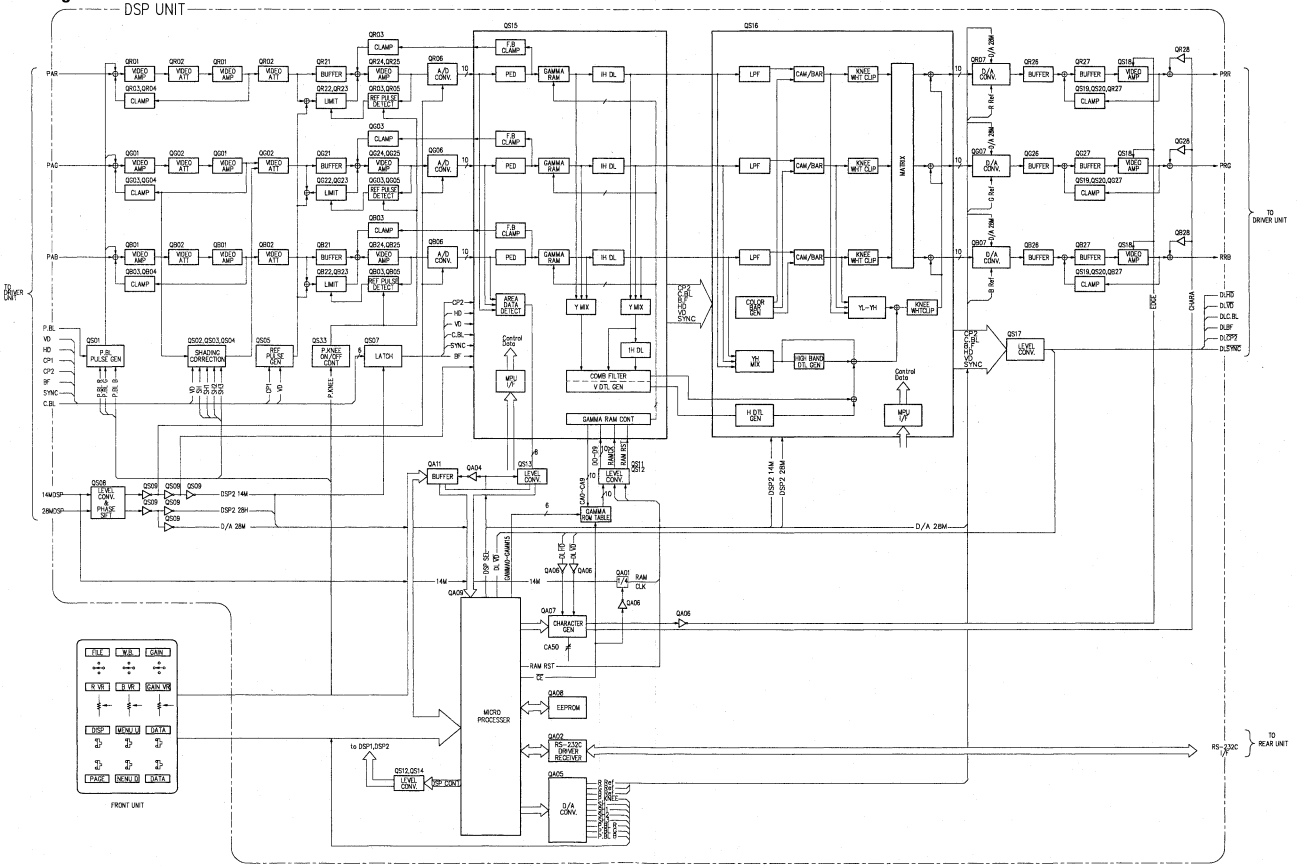
Component Side



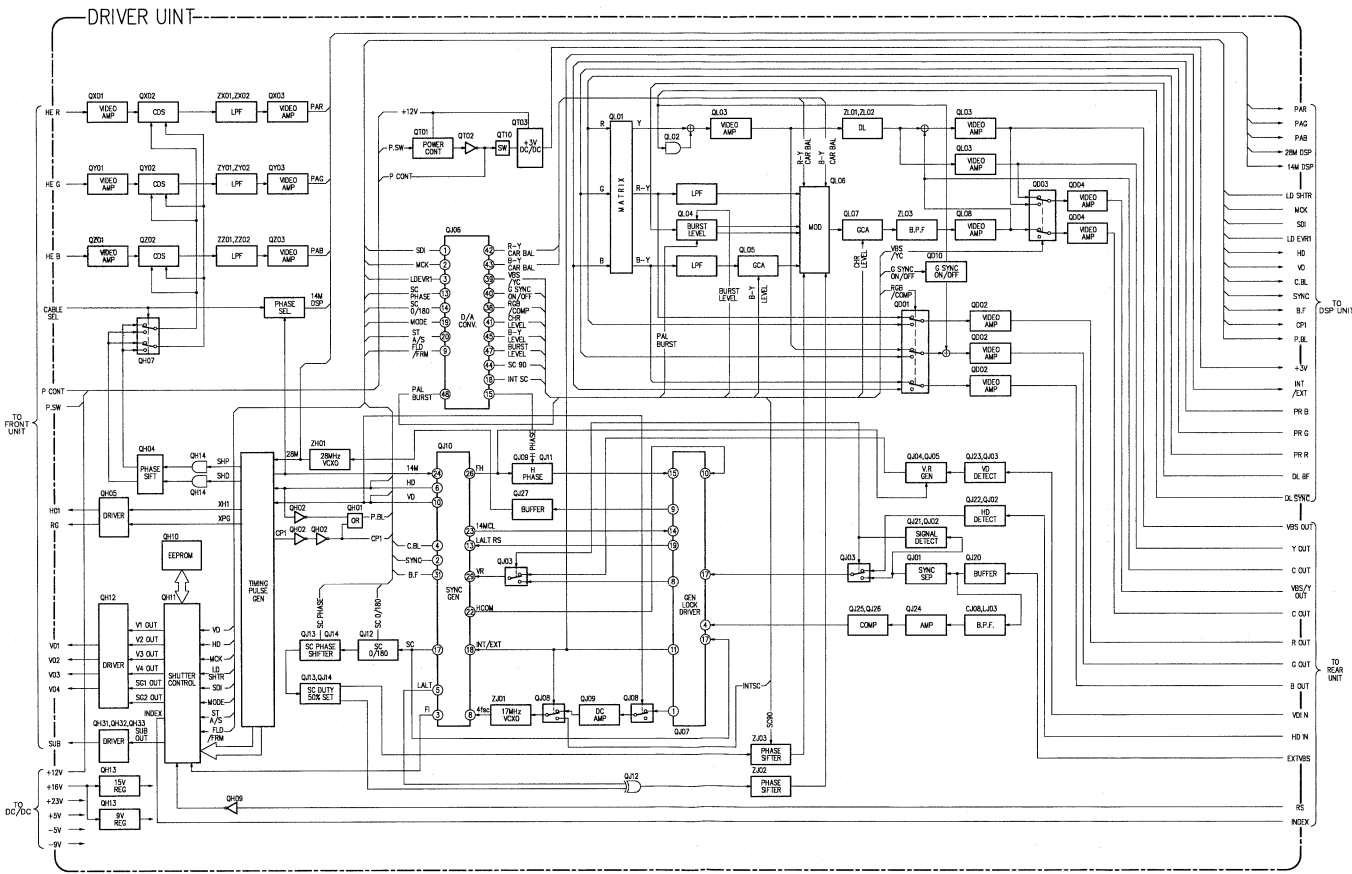
Soldering Side

2. BLOCK DIAGRAMS

2-1. DSP Block Diagram

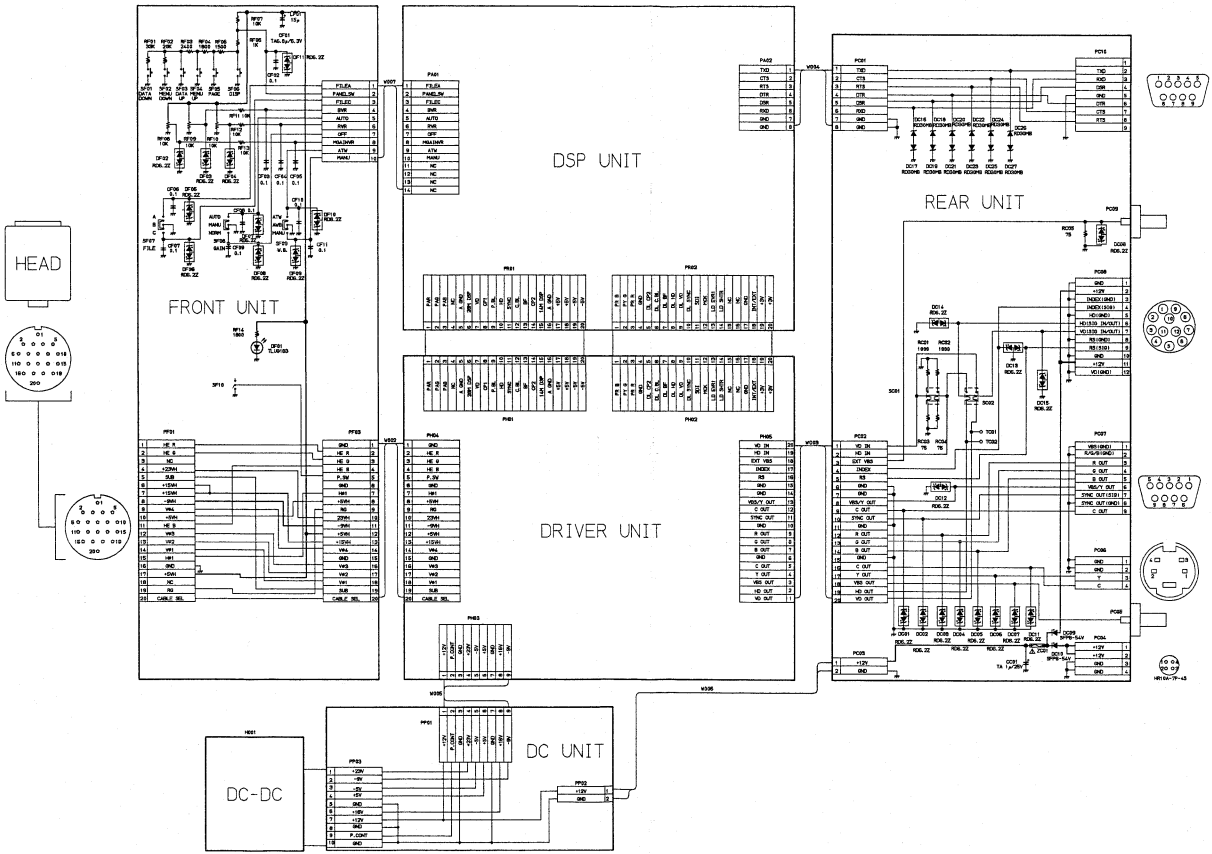


2-2. Driver Block Diagram

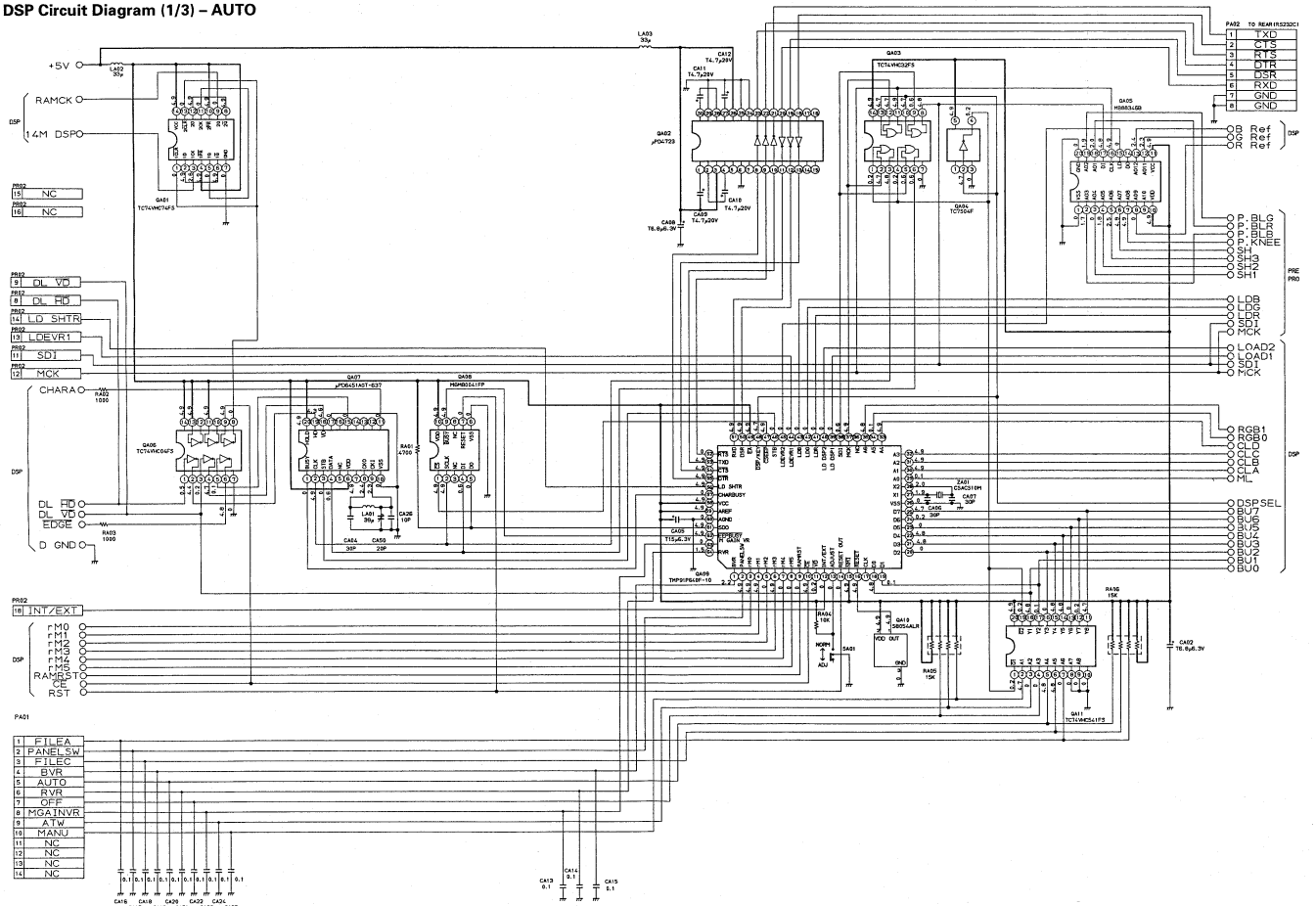


3. CIRCUIT DIAGRAMS

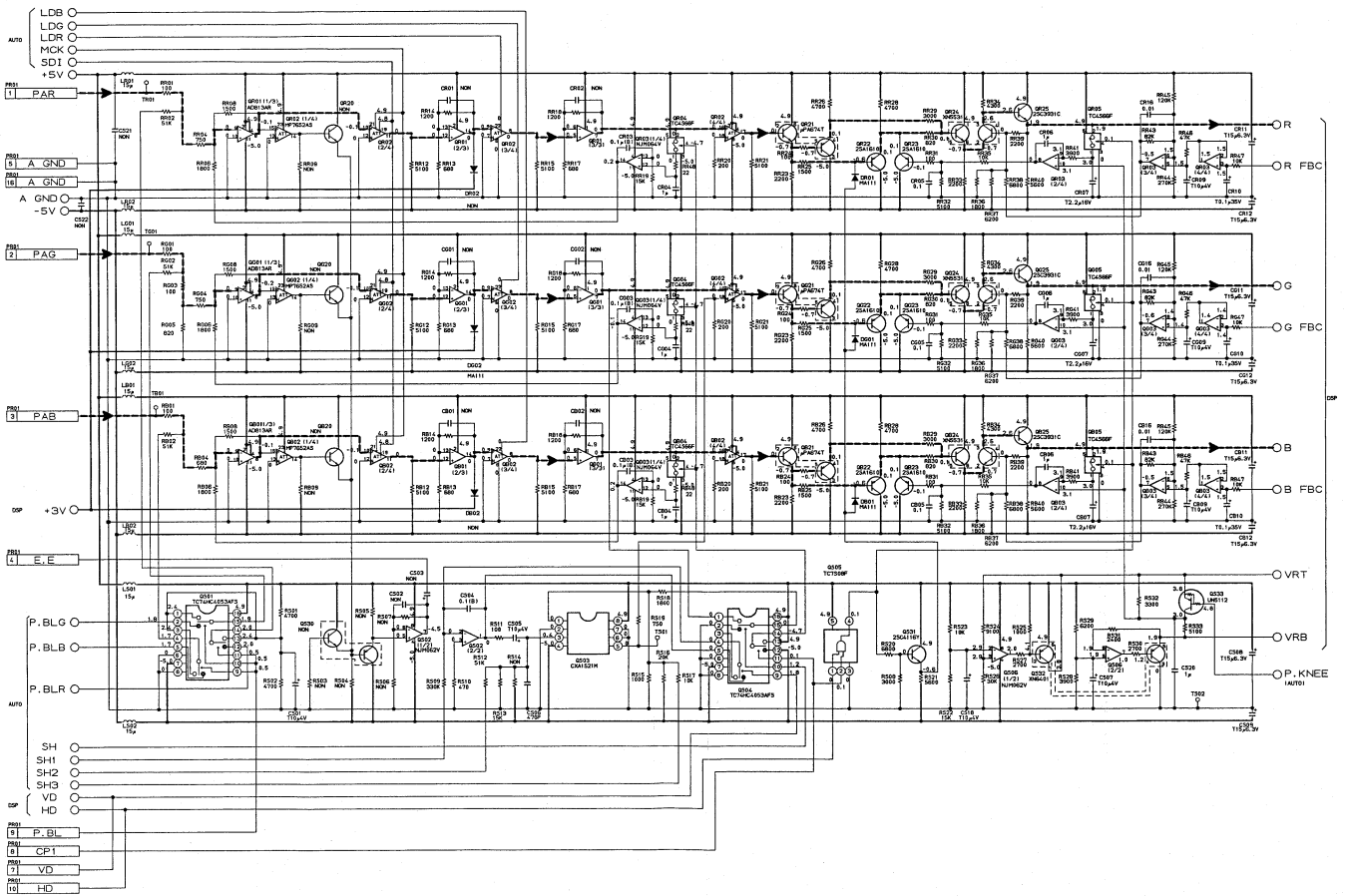
3-1. Overall Wiring Diagram



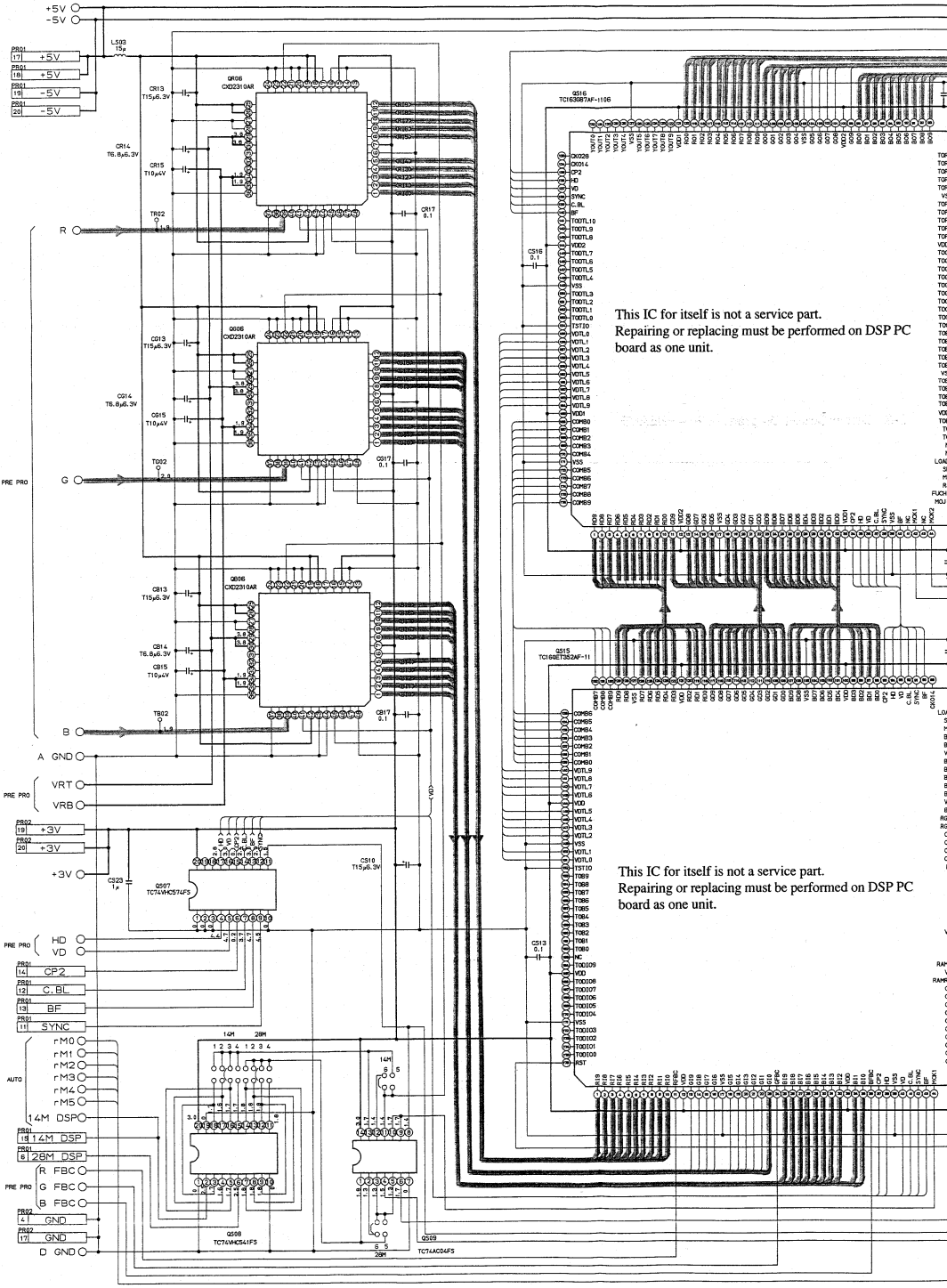
3-2. DSP Circuit Diagram (1/3) – AUTO



3-3. DSP Circuit Diagram (2/3) – PREPROCESS



3-4. DSP Circuit Diagram (3/3) – DSP


This IC for itself is not a service part.
Repairing or replacing must be performed on DSP PC board as one unit.
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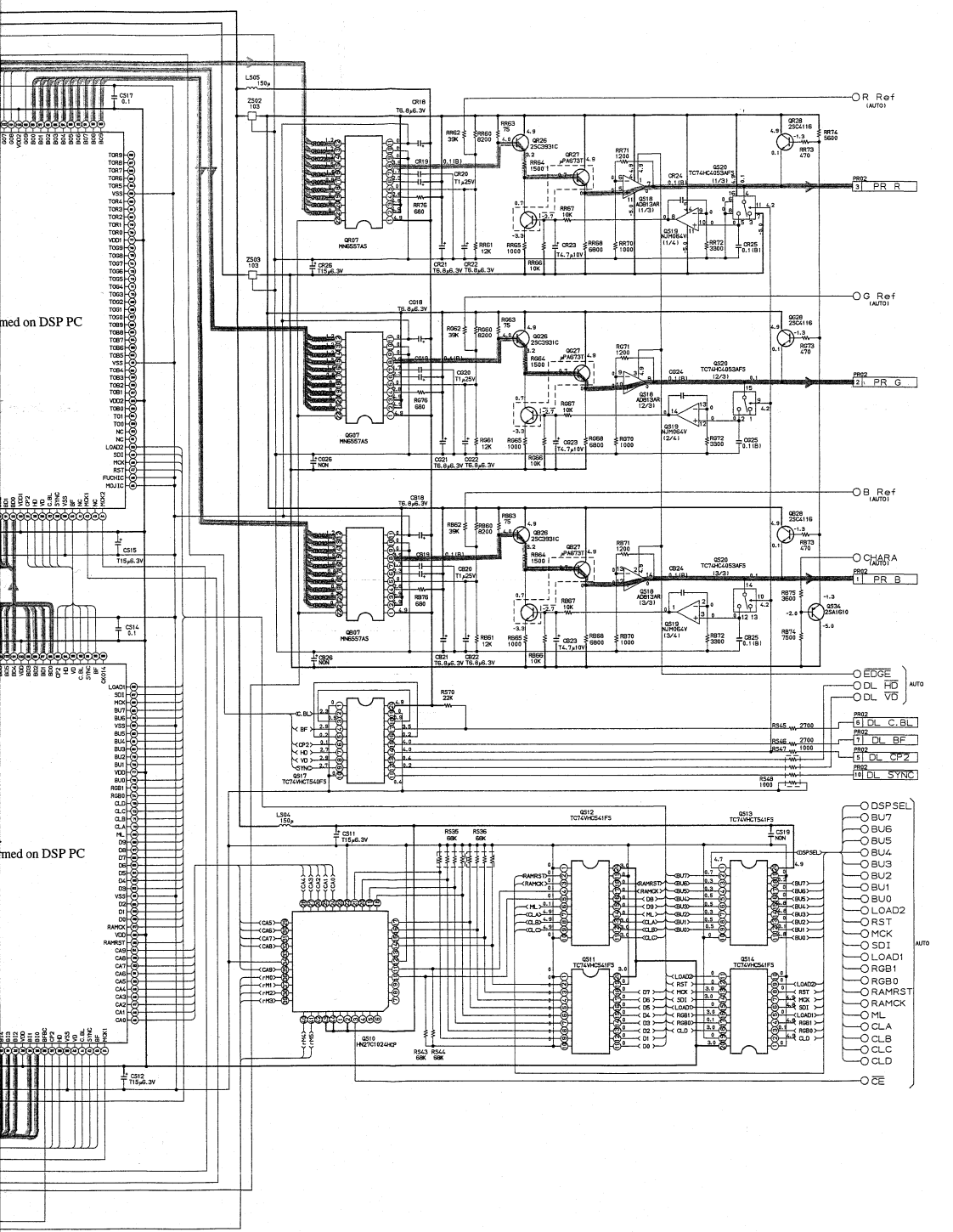
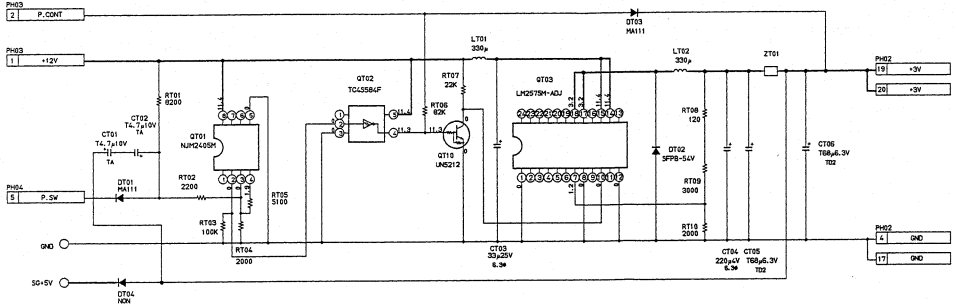
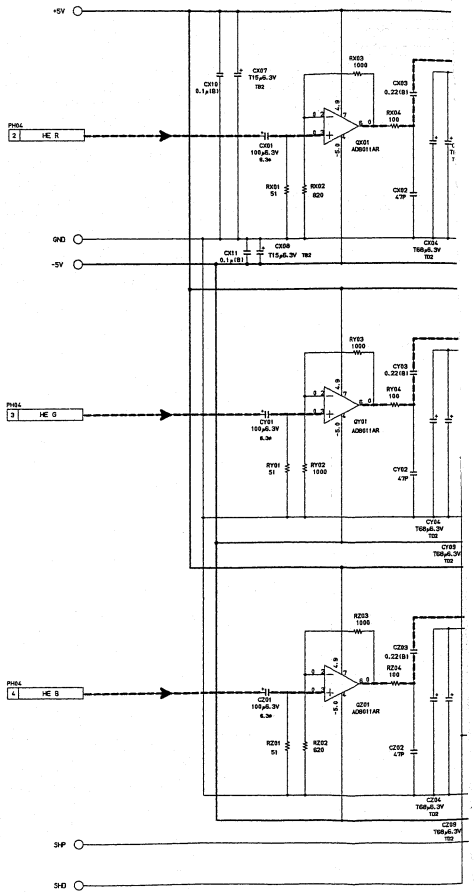

R Ref
(AUTO)
G Ref
(AUTO)
B Ref
(AUTO)
CHARA
(AUTO)
PR R
PR G
PR B
EDGE
DL HD
DL VD
DL C.BL
DL BF
DL CP2
DL SYNC
AUTO
DSPSEL
BU7
BU6
BU5
BU4
BU3
BU2
BU1
BU0
LOAD2
RST
MCK
SDI
LOAD1
RGB1
RGB0
RAMRST
RAMCK
ML
CLA
CLB
CLC
CLD
CE
med on DSP PC
med on DSP PC

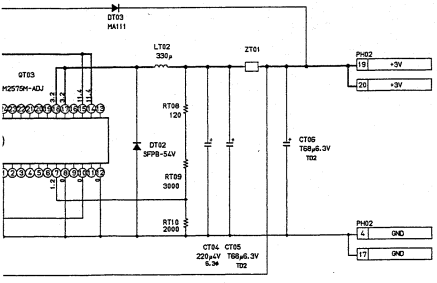
3-5. Driver Circuit Diagram (1/6) – 3V PS

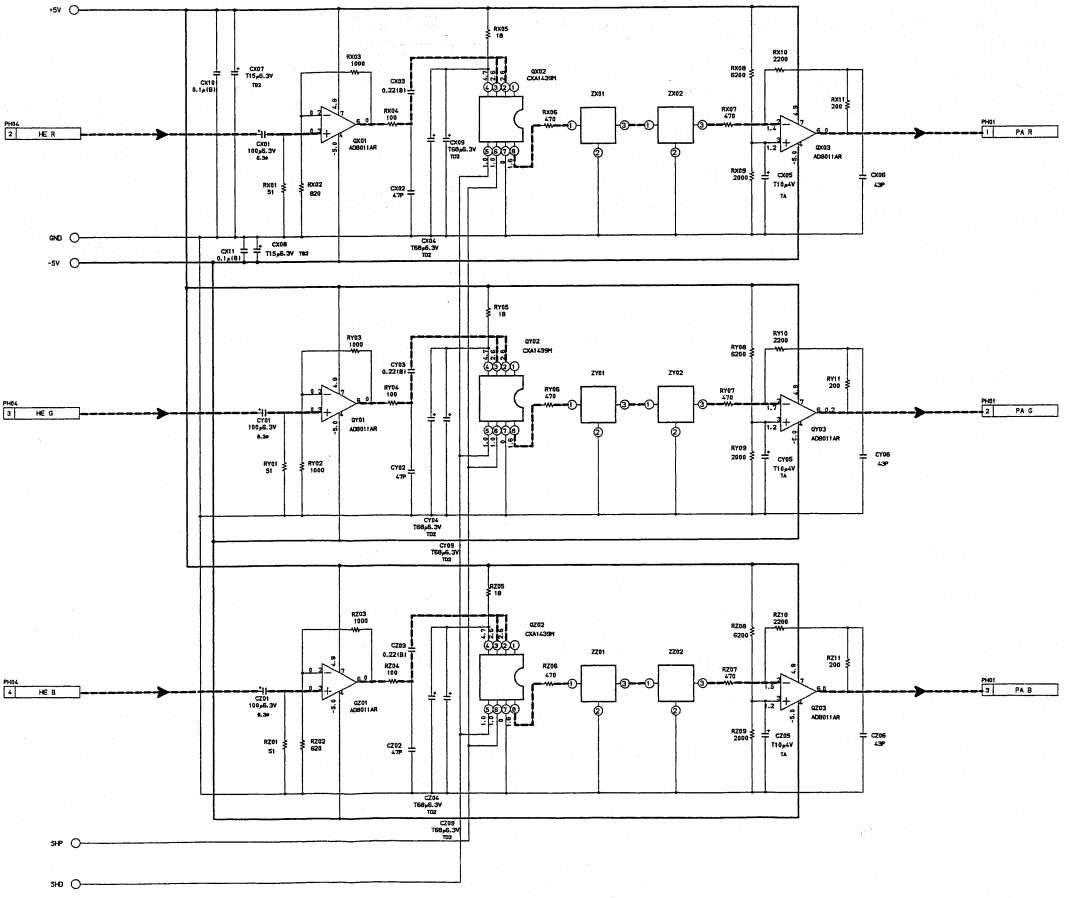


3-6. Driver Circuit Diagram (2/6) – PREAMP

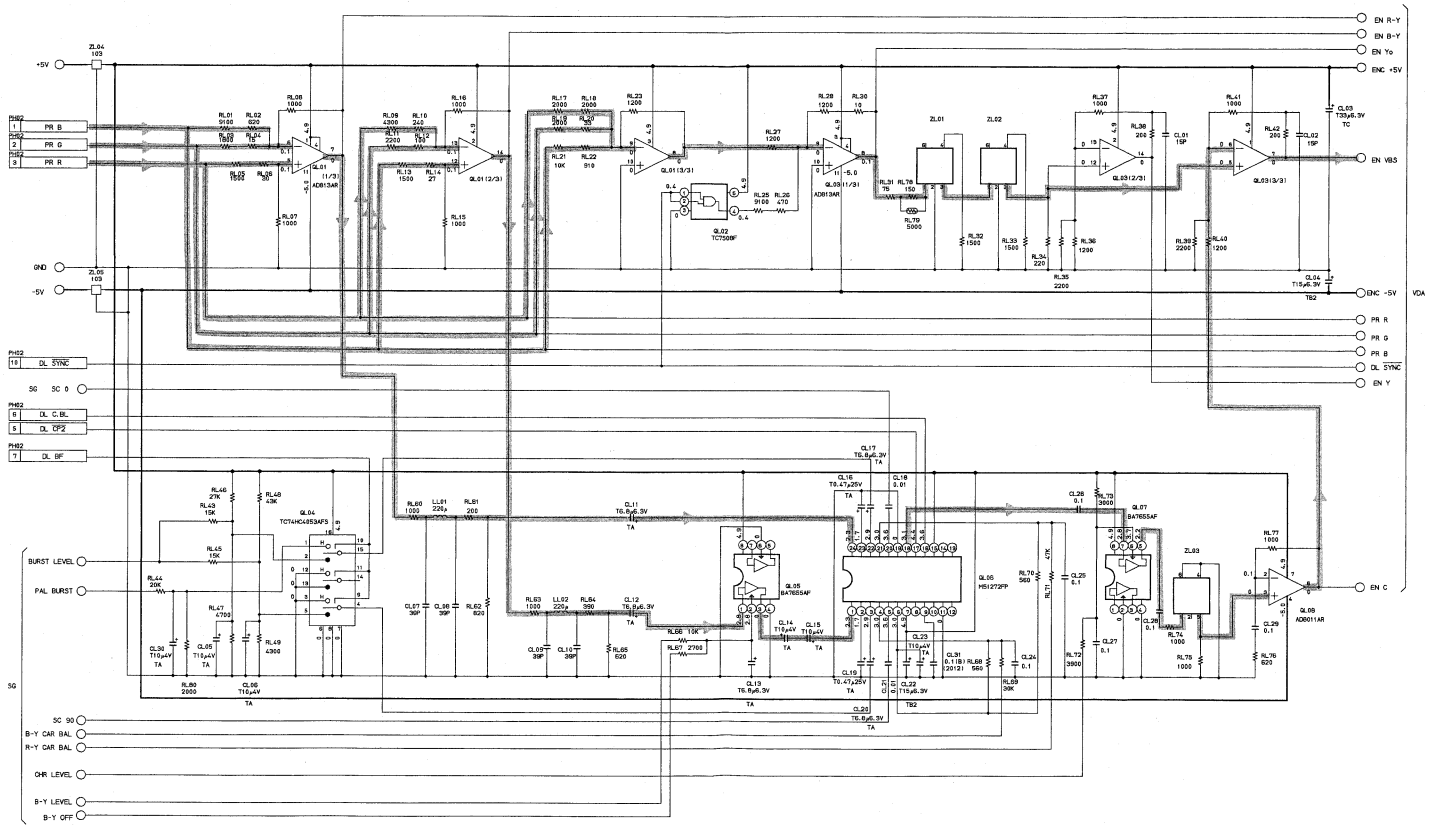


3-6. Driver Circuit Diagram (2/6) – PREAMP

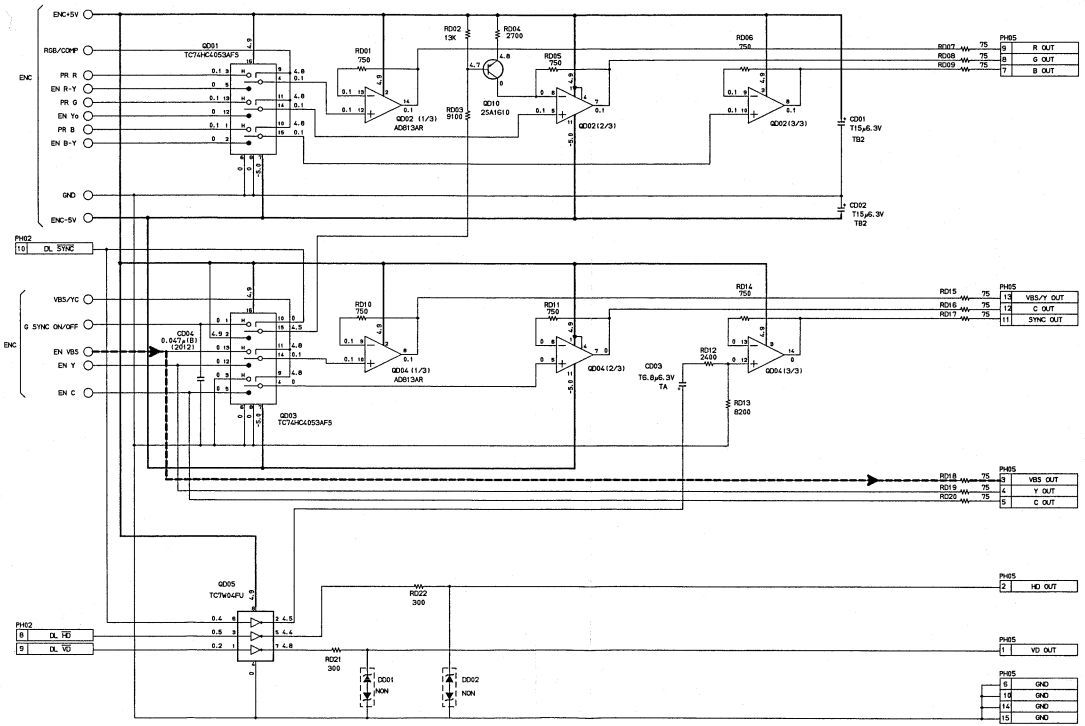




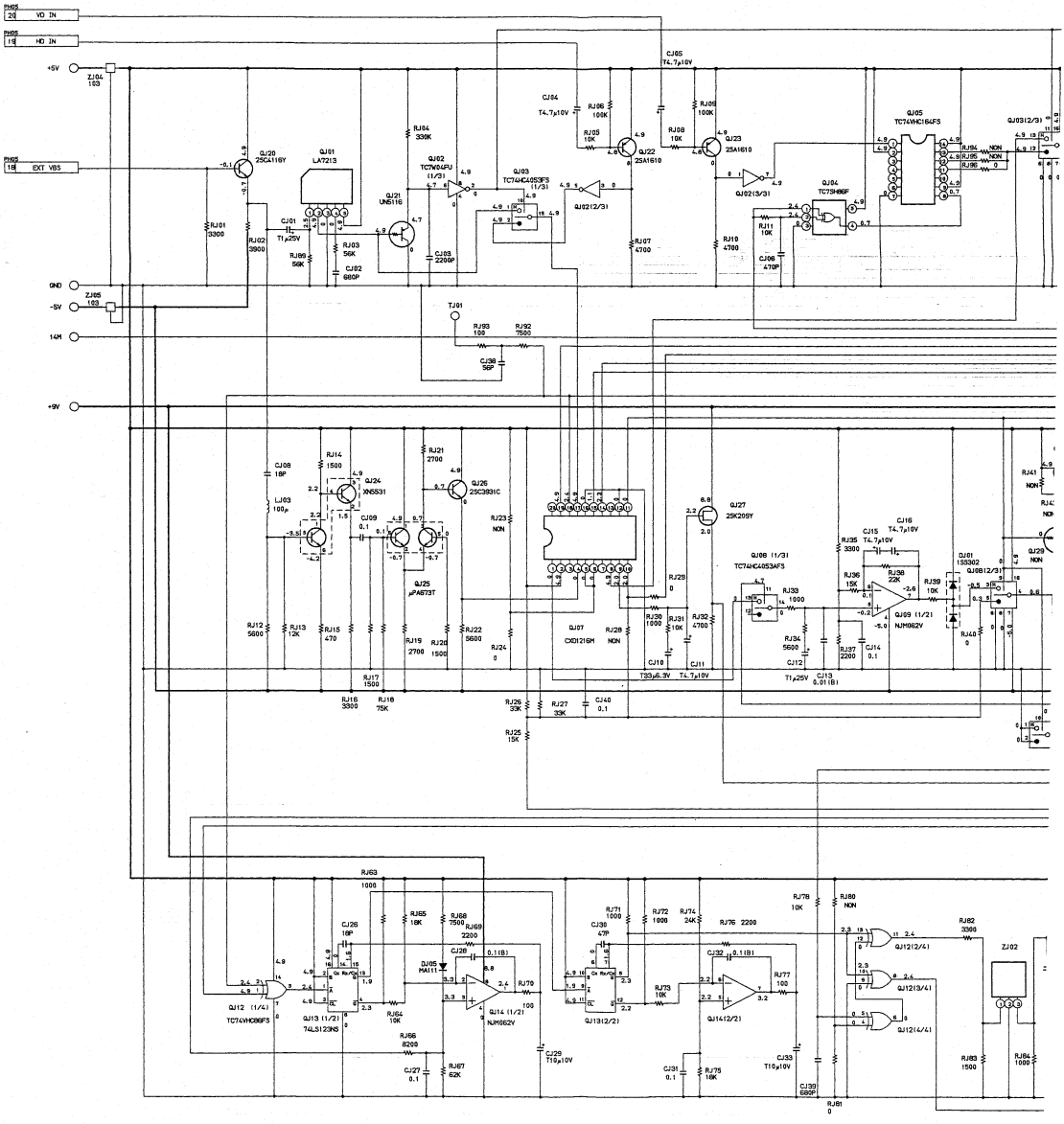
3-7. Driver Circuit Diagram (3/6) – ENCODER

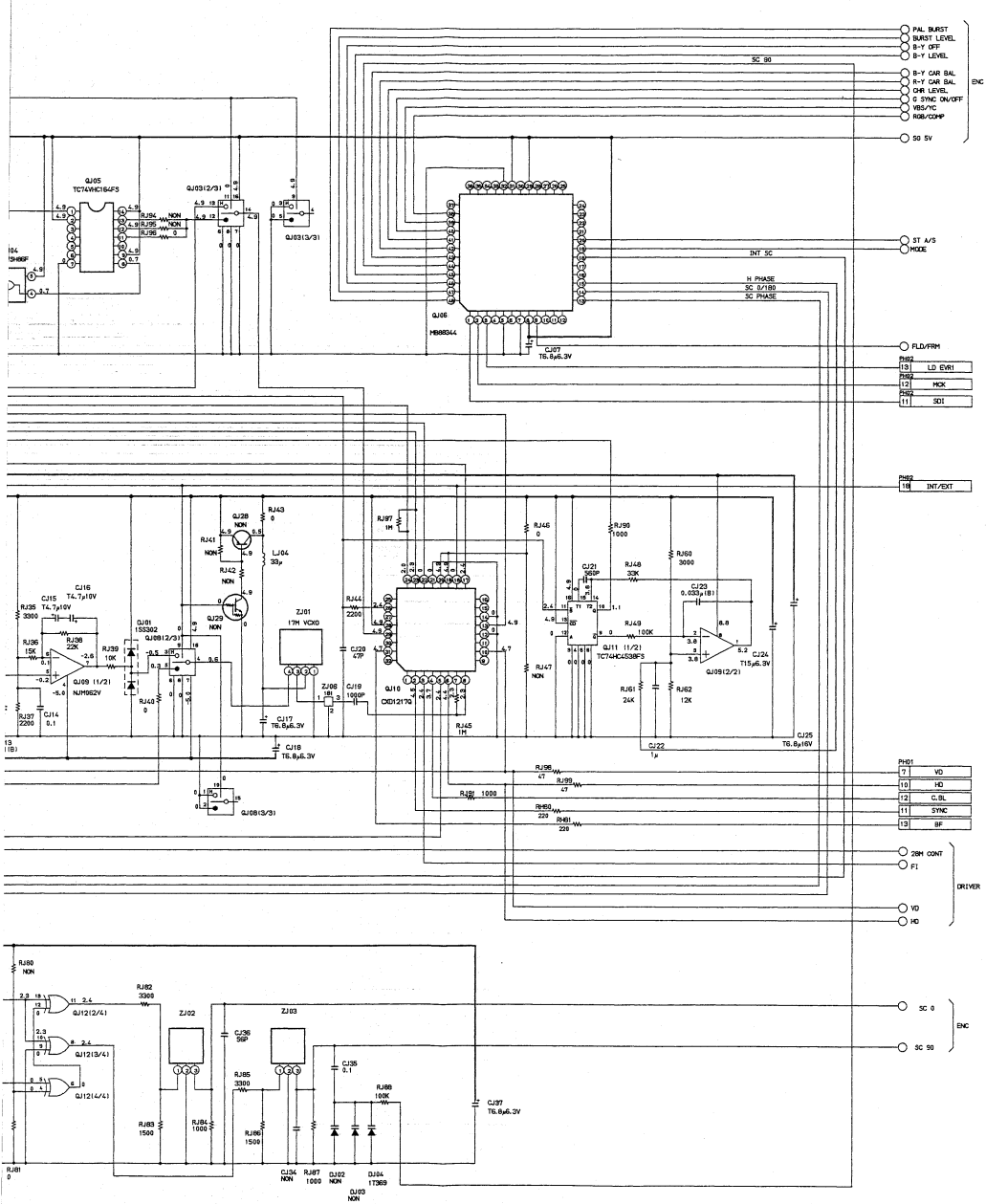


3-8. Driver Circuit Diagram (4/6) – VDA

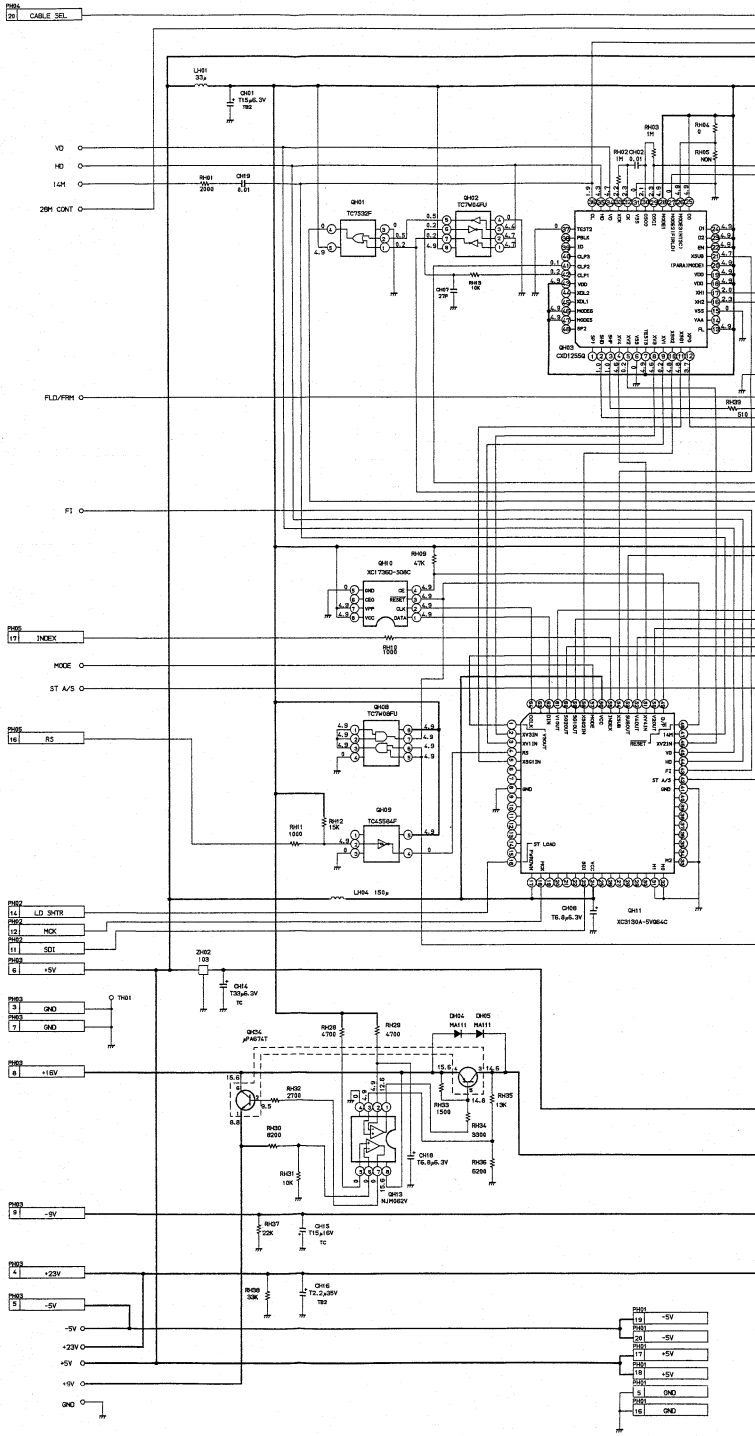


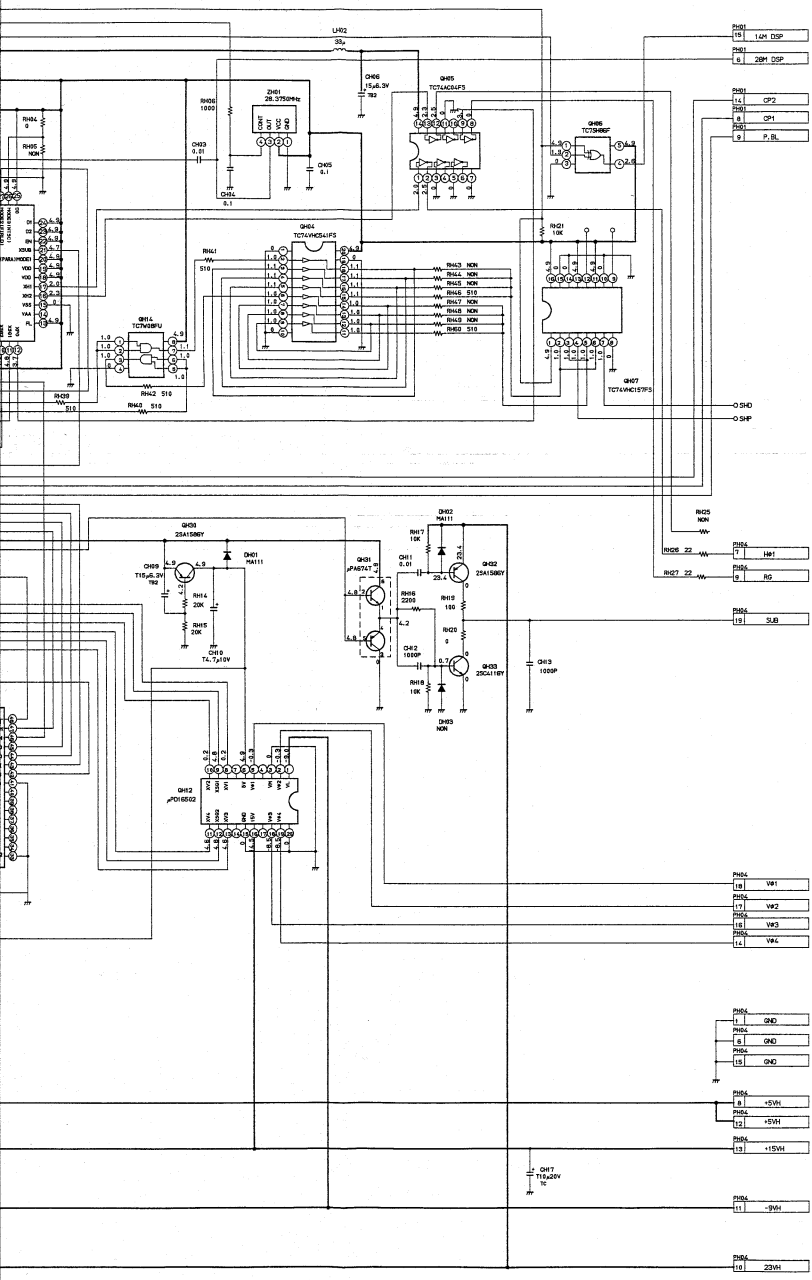
3-9. Driver Circuit Diagram (5/6) – SG




PAL BURST
BURST LEVEL
B-Y OFF
B-Y LEVEL
SC 90
B-Y CAR BAL
R-Y CAR BAL
CHR LEVEL
C SYNC ON/OFF
VBS/YC
RGB/COMP
ENC
SO 5V
ST A/S
MODE
INT SC
H PHASE
SC 0/180
SC PHASE
FLD/FRM
LD EVR1
MCK
SDI
INT/EXT
VD
HD
C.BL
SYNC
BF
28M CONT
FI
VD
HD
DRIVER
SC 0
SC 90
ENC

3-10. Driver Circuit Diagram (6/6) – DRIVER





SECTION 5
SPECIFICATIONS

1. SPECIFICATIONS

Power supply	DC12V ±10%
Power consumption	7.6W
Pick-up system	RGB, 3 CCD, Micro prism system
Image sensor	1/3 inch IT-CCD
Effective pixels	Horizontal: 752 pixels, Vertical: 582 pixels
Scanning system	2:1 interlace
Scan frequency	Horizontal: 15.625kHz, Vertical: 50.00Hz
Sync system	Internal/External (automatic switching)
Horizontal resolution	750 TV lines
Sensitivity	F8 (2000 lx, 3000K)
Minimum illumination	10 lx. (F2.2, Sensitivity +18 dB, 3000K)
SN ratio	61 dB standard
Lens mount	C mount (flange back: 17.526 mm in-air)
Ambient operating temperature	32 ~ 104°F (0 ~ 40°C)
Ambient humidity	Less than 90%
Weight	Camera head: Approx. 2.1 oz (60g), Camera control unit: Approx. 1.48 lbs (670g)
External dimension (except for protruded portions)	Camera head: 1.28" (W) x 1.57" (H) x 1.58" (D) (32.5 (W) x 40 (H) x 40.2 (D) mm) Camera control unit: 4.33" (W) x 1.57" (H) x 6.14" (D) (110 (W) x 40 (H) x 156 (D) mm)
Scene file (user memories)	A, B, C
White balance	ATW (Automatic tracing white balance), AWB (Automatic white balance), MANU (Manual)
Gain	AUTO (Automatic gain control), MANU (Manual), NORM (0 dB)
Output signal	VBS: 75Ω unbalanced, BNC connector, PAL standard Y/C: 75Ω unbalanced, S terminal RGB or Y/PR/PB: 75Ω unbalanced, D sub 9 pin connector VBS or Y/C: 75Ω unbalanced, D sub 9 pin connector
External sync input	VBS/BB: 75Ω unbalanced, Sync negative BNC connector SYNC 0.3V, Burst 0.3V HD or VD: 2 ~ 5V(p-p) Negative
Sync signal output	SYNC: 2.5 ± 1V(p-p), 75Ω unbalanced HD or VD: 5V $^{+0.5}_{-0.5}$ V(p-p), Negative, Load impedance: More than 10 kΩ
1 pulse trigger	TRIGGER: L level: Less than 0.5V, H level: 4 ~ 5V, Positive
Index output:	INDEX: L level: Less than 0.5V, H level: 4 ~ 5V Negative , Load impedance: More than 10 kΩ
Remote interface:	Serial data interface (RS-232C standard)
Option (Optional parts)	EXC-T403 (Camera cable 9' 9" (3m)) EXC-T406 (Camera cable 21'10" (6.5m)) EXC-T410 (Camera cable 32'10" (10m))